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MACKENZIE VALLEY PIPELINE INQUIRY

IN THE MATTER OF APPLICATIONS BY EACH OF

- (a) CANADIAN ARCTIC GAS PIPELINE LIMITED FOR A RIGHT-OF-WAY THAT MIGHT BE GRANTED ACROSS CROWN LANDS WITHIN THE YUKON TERRITORY AND THE NORTHWEST TERRITORIES, and
 - (b) FOOTHILLS PIPE LINES LTD. FOR A RIGHT-OF-WAY THAT MIGHT BE GRANTED ACROSS CROWN LANDS WITHIN THE NORTHWEST TERRITORIES,
- FOR THE PURPOSE OF A PROPOSED MACKENZIE VALLEY PIPELINE

and

IN THE MATTER OF THE SOCIAL, ENVIRONMENTAL AND ECONOMIC IMPACT REGIONALLY OF THE CONSTRUCTION, OPERATION AND SUBSEQUENT ABANDONMENT OF THE ABOVE PROPOSED PIPELINE

(Before the Honourable Mr. Justice Berger, Commissioner)

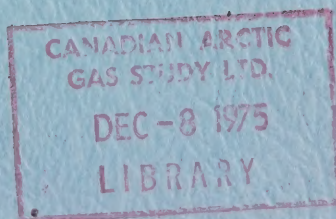
Yellowknife, N.W.T.

November 21, 1975.

PROCEEDINGS AT INQUIRY

Volume 92

347
M835
Vol. 92



APPEARANCES:

Mr. Ian G. Scott, Q.C.,
Mr. Stephen T. Goudge,
Mr. Alick Ryder and
Mr. Ian Roland for Mackenzie Valley Pipeline
Inquiry;

Mr. Pierre Genest, Q.C.,
Mr. Jack Marshall, and
Mr. Darryl Carter for Canadian Arctic Gas
Pipeline Limited;
Mr. Reginald Gibbs, Q.C.,
Mr. Alan Hollingworth &
Mr. John W. Lutes, for Foothills Pipe Lines Ltd.;

Mr. Russell Anthony &
Pro. Alastair Lucas for Canadian Arctic Resources
Committee;

Mr. Glen W. Bell and
Mr. Gerry Sutton, for Northwest Territories
Indian Brotherhood, and
Metis Association of the
Northwest Territories;

Mr. John Bayly
or
Miss Leslie Lane for Inuit Tapirisat of Canada,
and The Committee for
Original Peoples Entitle-
ment;

Mr. Ron Veale and
Mr. Allen Lueck for The Council for the Yukon
Indians;

Mr. Carson H. Templeton, for Environment Protection
Board;

Mr. David Reesor for Northwest Territories
Association of Municipal-
ities;

Mr. Murray Sigler for Northwest Territories
Chamber of Commerce.

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I N D E X

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WITNESSES FOR CANADIAN ARCTIC GAS PIPELINE LIMITED:

Alexander William Francis BANFIELD

Russell Alexander HEMSTOCK

Peter J. McCART

- Cross-Examination by Mr. Bayly
- Cross-Examination by Mr. Ryder

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14019

Banfield, Hemstock, McCart
Cross-Exam by Bayly

Yellowknife, N.W.T.

November 21, 1975.

(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

THE COMMISSIONER: Well, we'll
come to order. Mr. Bayly, you can begin.

ALEXANDER WILLIAM FRANCIS
BANFIELD,
RUSSELL ALEXANDER HEMSTOCK
PETER J. MCCART, resumed:

CROSS-EXAMINATION BY MR. BAYLY (CONTINUED):

Q Dr. McCart, I take it
from the fact that your studies were concentrated on
the North Slope that any study of commercial fisheries
either existing or potential in the Mackenzie itself
were left to the government agencies, the Department
of Fisheries, to study, is that correct?

WITNESS MCCART: Well, to
begin with, our studies weren't concentrated on the
North Slope. We did at least as much work down the
Mackenzie Valley as we did on the North Slope, and in
addition to that of course we have been carrying out
a study over the last year along the cross-delta route
for the first part. The second part you were asking
me whether we had in fact done studies of potential
commercial fishery?

Q That is correct, yes.

A Well, in studying Arctic
char and ciscos as we have, these are -- and the white-
fish, these are the species which would be part of
any potential commercial fishery, and in fact we have
-- we were asked for our opinion at one point about

Banfield, Hemstock, McCart
Cross-Exam by Bayly

1 the potential for commercial fishery at the mouth of
2 Firth River.

3 Q All right, and does this
4 have anything to do with the way you use the term
5 "significant populations"?

6 A Well, where I use
7 "significant populations", I may have used it in
8 several senses, if you could give me an example of
9 what you mean.

10 Q You have said, for
11 example, that the Firth River contains a significant
12 population of overwintering char at various spots in
13 either its own upper reaches or in the upper reaches
14 of one of its tributaries. Is that significant in
15 size, or does that have anything to do with significance
16 as a potential fishery, or in what sense did you mean
17 that?

18 A Well, you know, I'd like
19 to see where I said it actually. I may have used the
20 phrase in that way but normally I don't use it.

21 Q All right. Well when you
22 say "significant fishery" or a "significant population"
23 what is the range of things that you can mean? Because
24 it's a term that has been used by you and you say that
25 you have given it several meanings.

26 MR. MARSHALL: Can you give
27 us a specific example that would assist the witness,
28 Mr. Bayly?

29 MR. BAYLY: Mr. Commissioner,
30 I have given one example and I don't have a transcript

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Cross-Exam by Bayly

1 reference. If the witness doesn't remember the example
2 then I'll leave it at that for this point, perhaps
3 finding it for next time we sit rather than stop to
4 look for one. I had assumed that because the word
5 had been used on several occasions that the meaning of
6 it would be one that the witness would not have
7 difficulty with, although --

8 MR. RYDER : I might be able
9 to assist my friend, in Volume 85-A there is a dis-
10 cussion of this, of "significant populations." That's in
11 Dr. McCart's cross-examination when he was a member
12 of the Phase 2 panel.

13 MR. BAYLY: Well, here is an
14 example that I'm grateful to Commission counsel for
15 finding, Dr. McCart, it's found at page 14729 of the
16 volume he's quoted, in answer to cross-examination by
17 Mr. Scott, question at line 2:

18 "So what makes a significant fish river is not
19 the species primarily that is there?

20 A No.

21 Q It is the importance of the river to a species
22 or several species of fish.

23 A Yes.

24 Q Now are you concerned about volumes?

25 A The volume of ~~dis~~charge of the river?

26 Q No, the volume of fish that is found there, is
27 that what makes it significant -- numbers?

28 A Well, in part, yes; but again we could have a
29 population, for instance there are several
30 situations where we found isolated populations

Ban field, Hemstock, McCart
Cross-Exam by Bayly

1 in very short sections of streams above
2 impassable falls. Now we are concerned about
3 these because they constitute populations in
4 themselves. They may number only several hundred
5 but we are interested in preserving the genetic
6 identity of populations, and you can't do that
7 of course if you -- it is not necessarily
8 numbers we are concerned about, as I say,
9 preserving populations and we want to be
10 assured that by a significant portion of the
11 population I am concerned that we don't want
12 to reduce the population size to the extent
13 that there will be a long-term reduction in
14 population size."

15 A It sounds to me like I
16 didn't use the phrase "significant population". I was
17 responding to someone else's use of that term. I am
18 willing to talk about a significant portion of a popula-
19 tion, but any population is significant in that we
20 want to preserve populations because populations are
21 genetic entities in themselves.

22 Q So you would say that
23 the size isn't the only determining population, if we
24 want to get away from this word of importance of a
25 fish population, that "significant" is one that you'd
26 rather not use.

27 A Yes.

28 Q Now, importance is
29 something in the eyes of a fish biologist that may be
30 different, say, to the eyes of a person with a fish

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Cross-Exam by Bayly

1 camp at a particular location. Would you agree that
2 that might be possible?
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McCart
Cross-Exam by Bayly

A Yes. I think the importance is -- it's a word that requires some sort of qualification. It has to be important to or important for and obviously the importance to people can be quite different depending on who they are.

Q Right. So that it would be possible to imagine a situation occurring after pipeline construction where siltation had destroyed, say a population of, say a portion of a population which overwintered downstream of the pipeline, which was not important in the sense of wiping out the entire population in that river, in that it would recover in time in the opinion of you and other fish biologists, but that might be something which to an individual or a group of individuals who counted on that particular spot to fish in, it might be significant for a period of years until that recovery took place.

MR. MARSHALL: I really don't see how the witness can answer a question like that, sir. There are so many components to it and there are so many value judgments built into the question that a simple response to a question like that is just impossible.

MR. BAYLY: I'm not asking necessarily for a simple response, Mr. Commissioner.

MR. MARSHALL: I don't think the question is really comprehensible. I certainly can't understand it. Maybe Dr. McCart can but I don't understand what the question means. I'm sorry Mr.

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Cross-Exam by Bayly

1
2 Bayly, but you have built in so many different factors
3 to that question. I think it's really unfair to put
4 it to Dr. McCart.

5 MR. BAYLY: Let me put it as
6 simply as I can, Mr. Commissioner. The pipeline is
7 built. This is an example, Dr. McCart. A juvenile
8 population of Arctic char on the Firth River has an
9 overwintering spot below the pipeline and that population
10 is destroyed. Now, in your opinion, it may be that
11 eventually juveniles will again use that spot but if
12 somebody is using that as their fishing spot, it may
13 be sometime before the species recovers to the extent
14 of using that spot. Would you agree with that?

15 MR. MARSHALL: Would he agree
16 with what? There are about six different propositions
17 in there. Any one of which he may take violent
18 exception to.

19 MR. BAYLY: Now, surely, Mr. --
20 Well, perhaps the Commissioner could make a ruling. I
21 think the objection is clear enough.

22 THE COMMISSIONER: Well, you --
23 this isn't a trial or anything of that sort. The
24 question is a complicated one. Are you -- do you feel
25 you can comment on it? I don't take it that you adopt
26 everything that you don't happen to deny vehemently.
27 This isn't that kind of proceeding.

28 MR. MARSHALL: Well, sir, they
29 keep coming back again and again as if they have been
30 gospel and that's what -- I'm sorry to interject like

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Cross-Exam by Bayly

1
2 this but that sort of statement gets made and the
3 witness in trying to be helpful gives a short answer
4 and then it's taken that he has adopted all of the
5 assumptions built into the question and they come
6 back again in the record and are repeated again and
7 again and it seems to me that they can be a little bit
8 more precise about it and in fairness to the witnesses
9 we ought to. If we could take them through it step
10 by step and see if he agrees that such is a possibility
11 to begin with. If it's not something that's possible
12 in the witness's judgment is there any point in our
dealing with it.

13 MR. BAYLY: I'm prepared to
14 do it that way, Mr. Commissioner.

15 THE COMMISSIONER: Well, you
16 do it that way. I would like to make one thing clear.
17 These witnesses, all of them on this panel, on behalf
18 of Arctic Gas have stated their views in their evidence
19 in chief. I have those views in mind. Where they have
20 indicated that there is, in their view likely to be no
21 environmental damage and so on and so forth, I take it
22 that that is their evidence. Where hypothetical
23 situations are put to them and they're asked to comment
24 on those, I don't assume that they now agree whatever
25 the hypothetical proposition may be is likely to occur.
26 It's simply put for the basis of illuminating our
27 knowledge of this whole web of cause and effect that
28 is going to develop here in the north and is already
29 developing if this pipeline is built. Anyway, go ahead
30 and do it piece by piece and let's see if we get along.

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MR. BAYLY: Q All right.

Would you agree, Dr. McCart, that in a small stream, it would be possible that siltation would cause the entire fish population potentially to be destroyed if they were downstream?

A No.

Q All right. Would you agree that it would be possible to wipe out a significant -- I shouldn't use that word -- a portion of the eggs of that fish population downstream of the pipeline crossing?

A Eggs, yes.

Q And if that happened, those eggs wouldn't come to maturity?

A Well, if they were destroyed, they wouldn't, no.

Q Of course. And that would mean that at some point there would be fewer fish.

A Probably, yes. There would be a missing year class.

Q And whether that happened three years, five years, ten years or fifteen years later at some point there would be a year when there might be fewer fish of a certain size.

A There might be but I think it's kind of a complicated situation. If there's a missing year class, you might get better survival in the subsequent ones resulting from the reduction

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Cross-Exam by Bayly

competition so it's not necessarily so.

Q All right, if you have the siltation occurring at the time of construction and then siltation occurring as a result of some other cause that wipes out several years fish laying at a particular location, you may lose more than one year. Would you agree with that? That's a possibility.

A Yes, it's certainly a possibility, yes.

Q All right and would you agree that from a fisheries biologist point of view, it may be that because the species is going to recover that is not as important as it might be to somebody who counted on that particular location or area for his fishing?

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Cross-Exam by Bayly.

1
2 A I am not quite sure I under-
3 stand that question. Maybe you could rephrase it.

4 Q I am prepared to leave that
5 question, Mr. Commissioner. If it is difficult to
6 understand, I don't think I can make it any simpler.

7 Let's get back to definitions,
8 Dr. McCart. And I will refer you to the transcript
9 Volume 79, page 11708. Do you have a copy of that sir?

10 A No I haven't.

11 Q Would you permit me to read
12 the portion that I am interested in to you. Starting
13 on line 21, "I should point out that turbidity naturally
14 increases, of course, even during the summer where floods
15 occur as a result of rain storms so that the
16 additional turbidity would not be as serious as turbidity
17 which might have occurred during low water periods".

18 Now what I am concerned with
19 sir, is that I think there has been in the discussions
20 we have had, a failure to distinguish between the terms
21 turbidity and siltation and would you agree that there
22 is a difference?

23 A Yes.

24 Q And would you explain what
25 you mean by those two terms from the point of view of
26 the fisheries biologist?

27 A Well there are really three
28 terms that I think that I am interested in. One of them
29 is turbidity. Turbidity is a measure of the impedance
30 of a passage of a beam of light. In other words, if

1
2 the water is not clear, light does not pass through it.

3 The other term is suspended
4 sediments. These are materials which are carried along
5 by the water.

6 The third one, sedimentation.
7 These are the materials that settle out on the bottom,
8 no longer suspended, settle out on the bottom. This
9 would be sedimentation or siltation of the bottom.

10 Q Right. So, when you say
11 a stream is turbid, it means that the water is carrying
12 something that does not permit a beam of light to pass
13 through it. Is that correct?

14 A Yes, it is one measure, yes.

15 Q Now that doesn't mean that
16 that isn't some form of silt?

17 A Most often in the streams
18 we are speaking of it is silt that causes a reduction
19 in turbidity.

20 Q Yes. In answer to a question
21 asked, I believe it was by Mr. Anthony yesterday, you
22 distinguished between different kinds of materials you
23 said that would be difficult to set criteria for silt
24 loads in streams that were permissible silt loads in
25 streams, because there are different kinds of things
26 that might be carried. In other words, some of them
27 might be courser than others. Is that what you meant
28 by that?

29 A Yes.

30 Q And it may be that when you

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1
2 increase silt loads, you are increasing it by putting
3 something different in from what is there at present.
4 For example, if you put gravel into the stream and the
5 stream is brown because it is carrying a finer type of
6 material and the stream carries some of the fine sands
7 in the gravel as well, there may be a change in character
8 of the silt that is being carried.

9 A If in fact your bringing in
10 foreign materials from outside, this is possible yes.

11 Q Yes and I am assuming that
12 when we talk about select backfill in this Inquiry, we
13 were talking about bringing in something that is not
14 naturally found at the site specific location?

15 A That's true but I also, my
16 understanding is that this would normally be materials
17 without a high content of fines, relatively course
18 materials.

19 Q All right. Now, would it,
20 when you have been discussing the timing of siltation
21 problems or possible siltation problems, you and other
22 members of various/^{panels} have said they would occur at a time
23 when the natural silt loads being carried by the stream
24 were high.

25 A I think we said quite the
26 opposite. That if trenching takes place during the
27 winter, in many streams there would be no water. In
28 those streams in which there is water, the silt loads
29 would be high, the silt loads resulting from construction
30 would be high at a time when they are normally very low.

1
2 Q All right. But when they
3 are released and that is the time that we would be
4 concerned about, especially in those streams where they
5 are frozen to the bottom, the disturbance would cause
6 the silt, if any, to be picked up in the spring time.
7 Would you agree with that when the water begins to flow?

8 A Yes, we, I think stated that
9 scouring and cleansing of the stream bottom would occur
10 during the spring freshet at a time when loads are
11 normally high.

12 Q And if select material,
13 different materials from the normal kinds are introduced,
14 they may be carried along with the materials that the
15 stream is used to carrying?

16 A Yes.

17 Q And in some streams that
18 may be, they may be different in character?

19 A Yes.

20 Q And have you looked at the
21 possibilities that carrying these different materials
22 may have different effects on downstream growth of
23 algae, downstream growth of anything that is living in
24 the aquatic environment from the normal kinds of silt,
25 quite apart from the volumes that we were talking about?

26 A Well I don't think you can
27 look at it quite apart from the volumes because ob-
28 viously the volume of select backfill is going to be
29 very, very, very small in relationship to the total
30 sub-strate in the stream and in relationship to its total

Banfield, Hemstock, McCart.
Cross-Exam by Bayly

1
2 load of sediments in the spring.

3 Secondly, I should point out
4 that we have some data which indicates that the place-
5 ment of courser materials in streambeds can actually
6 be beneficial. There is an instance on the Canol Road
7 where we have examined an area in a stream where coarse
8 materials from the roadway had been placed in the stream
9 and had a much higher population of benthic invertebrates
10 than the natural areas, both upstream and downstream.
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Banfield, Hemstock, McCart
Cross-Exam by Bayly

1 Q No matter how much silt
2 a stream is carrying in the springtime, there is a
3 point at which, given a certain volume of water, it
4 is carrying all it can carry; is that correct?
5 The rest will precipitate out or sit on the bottom.

6 A That's right.

7 Q And if it is to be released
8 at all, if the volume of the water picks it up, it
9 may not be until after the peak silt load has been
10 carried.

11 A I suppose there may be
12 situations where that might occur. I might point out
13 that we are in fact studying this thing in streams
14 in South-eastern British Columbia, and that what we
15 have found is that in these small streams we can no
16 longer detect any effects, as far as sedimentation of
17 the bottom of crossings which took place during the
18 fall. In other words, we went back this spring, we
19 examined ^{them} in the fall as the ditching was taking place,
20 we examined in the spring. We can't detect any differ-
21 ence in the distribution of sediments and we can't
22 detect any significant difference in the densities
23 or the diversities of benthic invertebrate populations
24 in the streams.

25 THE COMMISSIONER: Ditching
26 for what?

27 A Inland Gas Pipeline, a
28 crossing similar to the one that we're discussing here.

29 MR. BAYLY: Q Now, does that --
30 is that the kind of study that leads you to make the

Banfield, Hemstock, McCart
Cross-Exam by Bayly

1 conclusion, or is it the type of study that gives you
2 an indicator?

3 A I'd say that there is
4 another way of approaching this, and that is to have a
5 hydrologist calculate the likelihood that the carrying
6 capacity of the stream would be exceeded by sediments
7 introduced in the form of select backfill.

8 Q Now, Dr. McCart, we've
9 had some discussion from the Environment Protection
10 Board on caribou, and the amount of kill that Porcupine
11 caribou herd can probably support from year to year
12 along with natural death situations, and still maintain,
13 apart from either natural or unnatural catastrophes
14 or diseases, its basic population at the general level
15 that it is at at the present. Do you do that kind of
16 study with fish?

17 A It can be done, yes. In fact
18 it is done regularly with commercial species such
19 as salmon.

20 Q And was it done on the
21 North Slope with Arctic char or grayling?

22 A No.

23 Q And does it have anything
24 to do with determining whether a species is resilient
25 or not?

26 A I'm not quite certain
27 what you mean by that. Does what have anything to do
28 with determining whether a species is resilient?

29 Q Given a population of
30 fish, like the char say in the Firth River, is it of

Banfield, Hemstock, McCart
Cross-Exam by Bayly

1 value in your opinion to look at the amount of population
2 that could be either destroyed, that could be made
3 unable to make it to its spawning grounds, or over-fished,
4 before the population would cease to be able to maintain
5 the levels that you feel are in the river at present?

6 A You see, the difficulty
7 with getting that kind of information is that you have
8 to go in and fish the population, and you have to
9 fish it down to the -- there are a number of populations,
10 fish them down to various levels, various proportions
11 of survivors and see what happens, and that's how you
12 determine these things. Now it has been done to some
13 extent in the Eastern Arctic with lake resident popula-
14 tions, but that's a tremendous insult to the population
15 to get these kinds of data. I don't think we want that
16 kind of data at all.

17 Q All right. Would you agree
18 that -- I understand that you don't want to destroy the
19 population to find out if it can be destroyed. That's
20 the ultimate ^{absurdity} / and given that, though, the data
21 itself would be valuable, if you could do it on say a
22 controlled population, that you could hypothesize
23 from one stream to another. I don't even know if that's
24 possible.

25 A If that information were
26 available from some other area, it would be useful to
27 have it.

28 Q Somebody has to do these
29 hypotheses, I put it to you, so that you can set fish
30 limits that anglers can take, or that commercial

Banfield, Hemstock, McCart
Cross-Exam by Bayly

1 fishermen can take.

2 A Certainly, somebody can
3 sit down and come up with a mathematical model which
4 would never be tested unless somebody sets up a
5 commercial fishery or someone goes in there and
6 examines a very, very heavy domestic fishery; but you
7 can -- the point I'm making is that mathematical
8 models must be tested. You can come up with all sorts
9 of parameters and make estimates and guestimates of
10 14 different parameters and you come up with a single
11 value at the end of it, and it may in fact be totally
12 meaningless.

13 Q Now, I can appreciate the
14 problems with the ability to do this kind of study.
15 But you have suggested that the real problems associated
16 with, say the fish and the Arctic char population in
17 the Firth River are unlikely to be associated with
18 pipeline construction. The worst case possibility
19 might be the wiping out of that juvenile overwintering
20 spot downstream of the pipeline. What would be worse
21 than that would be to build a road and allow a bunch
22 of people with fly rods and spinning tackle to go
23 in there and fish some of the nicer overwintering
24 spots upstream of the pipeline and that would be much
25 more destructive of the population.

26 A That's my opinion,
27 all right.

28 Q All right. Well now,
29 one of the concerns that came from witnesses we've
30 had from Alaska is that it's very difficult to control

Banfield, Hemstock, McCart
Cross-Exam by Bayly

1 the rights of construction workers, that is the company
2 may make a rule within its own boundaries and say,
3 "You may not fish," or "while you are working for the
4 company you may not fish." The difficulty appeared
5 to be in Alaska controlling people who got valid
6 licences from the governmental authority, stepping
7 outside the gates, going off on their week's holiday
8 and going up to the best fishing spot in the equivalent
9 of the Firth River and then taking fish out of it.
10 You would appreciate that as a problem that this
11 company would have to deal with on the North Slope.

12 A Right. I'd like to make
13 two points. No. 1, this major construction force would
14 be on the site in winter under conditions where they
15 are very unlikely to go fishing, and secondly, the
16 difference between the Alyeska experience and the
17 proposed gas pipeline is that there will be no permanent
18 roadway providing access to these places.

19 Q All right.

20 A Also I should point out
21 that the company has stated we would not permit fishing
22 by construction personnel.

23 Q I appreciate that the
24 company has said that, and I recognize it from earlier
25 evidence. All I was pointing out was that Alyeska
26 tried to do that too and found it very difficult, the
27 same way they found shipping people out very difficult.

28 THE COMMISSIONER: Well, the
29 first two points are -- the first point, of course,
30 is one that applies throughout the route above the

Banfield, Hemstock, McCart
Cross-Exam by Bayly

1 60th Parallel. The second point about no road, you're
2 talking about the North Slope.

3 A Yes, I was thinking, I
4 think you mentioned the North Slope.

5 MR. BAYLY: I mentioned the
6 North Slope because that's where you did most of your
7 studies.

8 A No, it's not where we
9 did most of our studies. As I pointed out before, we
10 have spent at least half and probably more of our
11 effort working down the Mackenzie Valley and in Alberta
12 and in British Columbia and in Saskatchewan.

13 Q I picked the North Slope
14 because the North Slope is a concern to my people as
15 well. Let's not worry about why I picked it, I don't
16 think that's important to the discussion. We're con-
17 cerned with the North Slope, you're concerned with it,
18 and I'm concerned with it so it probably doesn't matter
19 to either of us why.

20 A It seems to me, inciden-
21 tally, and I'm not certain of this, that the government
22 has restricted fishing along the Alyeska haul road
23 in the sense that there's a -- that you cannot fish
24 within, I think, it's something like two or three
25 miles on either side of that roadway. So it is not
26 merely a matter of Alyeska or any company controlling
27 the workers, you have to have, if you're going to set
28 up regulations, you have to set up some method of
29 enforcing them.

30 Q Yes.

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Cross-Exam by Bayly

1 A This is part of the
2 difficulty.

3 THE COMMISSIONER: Precisely.
4 That's why the question of whether Arctic Gas restricts
5 its employees is in a sense academic. The guidelines
6 indicate that those restrictions should be laid down
7 first by the Inquiry and then by the government.

8 MR. BAYLY: All right.

9 THE COMMISSIONER: But anyway,
10 let's carry on.

11 MR. BAYLY: Q You said there
12 would be no permanent road, and one of the concerns
13 that we have is one expressed by the panel consisting
14 of Mr. Weedon and Mr. Parker, and you may want to
15 comment on this. They envisaged the eventual construction
16 of a road if the North Slope route is used. They have
17 no authority to build that road, but they see that as
18 an inevitable following of the pipeline and related
19 facilities. Now if this were to happen, if this
20 were to be the case, from a fisheries point of view
21 would it alter your recommendations as to which route
22 you would opt for, for the applicant to take?

23 A The difficulty -- I don't
24 want to talk about Alaska particularly, but the problem
25 with the Alaskan route -- the interior route in
26 Alaska is that it does parallel the Canning River right
27 through an area which has a very large population of
28 fish, so that the damage to a population which might
29 occur in a situation where you actually parallel the
30 Marsh Forks for many miles in the vicinity of a number

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Cross-Exam by Bayly

1 of springs and very important overwintering and spawning
2 areas, it seems to me, you may in fact do more damage
3 to Arctic -- or take more Arctic char out or reduce
4 the overall populations of Arctic char on the North
5 Slope more by parallelling that one stream than by
6 crossing a large number of other ones at right angles.

7 Q So from a fisheries point
8 of view this might be far more critical in Alaska be-
9 cause of parallelling a river than the risks of cross-
10 ing a number of rivers.

11 A If you take the interior
12 route, you remember that our major objection to the
13 interior route is -- has to do with the fact that it
14 would parallel the Marsh Fork , and that that would
15 require a permanent roadway.

16 Q All right, so the fact
17 that the Dempster Highway would give some access to
18 interior streams is a less significant reason for
19 worrying about the interior than the Canning River and
20 the Marsh Fork .

21 A Well, I don't see
22 the relationship of the Dempster Highway to this.

23 THE COMMISSIONER: Excuse me.
24 I didn't even quite follow the question. Will you
25 repeat that, please?

26 MR. BAYLY: I was asking about
27 the fact that the Dempster Highway will link parts of
28 the Yukon with the Northwest Territories, and that
29 that may provide access, if not direct access by reason
30 of the fact that a person could step out of his car

Banfield, Hemstock, McCart
Cross-Exam by Bayly

1 at any one of the rivers, at least it would give him
2 more jumping off spots into the part of the country
3 that you're concerned with. Your main concern in the
4 interior route is not the interior streams in the
5 Yukon, but the Canning River.

6 A That's right.

7 THE COMMISSIONER: Let me
8 ask you a question, Dr. McCart.

9 Q The interior route would
10 cost Arctic Gas about \$500 million more than the
11 coastal route, and given that these calculations
12 relating to costs are usually on the low side, it
13 might well be even more costly to build by the interior
14 route. So that if they did build this thing, this
15 pipeline, bearing in mind that the Americans have a
16 say in this, whether it's coast or interior, and I
17 may be understating their role when I say they have a
18 say in it; they might very well get it along the coastal
19 route. You might get extensive exploration in the
20 Beaufort Sea in the years to come if you build a
21 gas pipeline because, of course, the pipeline and the
22 route would be an incentive to exploration in the
23 Beaufort Sea, and then you might get a road for access
24 to gathering /lines from the Beaufort Sea to the main trunk pipeline
25 along the coast. Though you feel the gas pipeline
26 would not in and of itself, cause substantial damage,
27 given appropriate safeguards, you did say that you
28 adopted Dr. Wilimovsky's rating regarding the dangers
29 of a highway, and those would be ten times as great
30 as a gas pipeline.

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Cross-Exam by Bayly

1
2 THE COMMISSIONER: I read his
3 evidence last night and I think it was something along,
4 one and then three to five and six to ten. So the
5 reason we are sort of, at least, I am interested in
6 looking ahead here is, that if a gas pipeline were to be
7 built, it would have to be made as plain as plain can
8 be that they should not allow a highway to be built there
9 within this generation or the next. Is that the kind
10 of proposition you would favor, if you were going to make
11 recommendations to the government?

12 A From a fisheries point of
13 view, yes, because it seems to me that, as I have said,
14 I don't think the gas pipeline in itself is going to
15 have any significant effect on populations of fish along
16 the North Slope.

17 However, if in fact there is
18 continuing development of one kind or another in the
19 area, I think that ultimately the fish populations,
20 unless they are very severe restrictions, which are
21 strongly enforced, that these fish populations are
22 eventually going to suffer, if there is increased access
23 because the populations, Arctic populations living in
24 these relatively unproductive waters are, in fact,
25 vulnerable to over-fishing.

26 I think I have used the example
27 before that apparently populations of lake trout in
28 Great Bear Lake have been affected as the result
29 apparently, almost entirely of angler pressure. Now,
30 that is a relatively remote area. Sports fishermen go

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1
2 in there in limited numbers and it is a large area and
3 yet the population has suffered to some extent.

4 So, if there is increased
5 access in essentially unlimited access to the North Slope
6 along the highway, I think that, yes, fish populations
7 would suffer and yes, I would not like to see one there.

8 THE COMMISSIONER: A question
9 before you carry on. This is unrelated. In the overview
10 hearings, Mr. Hatfield and Mr. Doran gave evidence and
11 I was rereading their evidence just because I knew you
12 would be giving evidence again today. They said that
13 nutrient levels in the Mackenzie River watershed, I am
14 not talking about the north coast now, but the Mackenzie,
15 nutrient levels in the Mackenzie watershed are about
16 ten times higher than those found in the Pre-Cambrian
17 Shield. I don't know whether they meant the whole of
18 the Shield. And they say that this results in higher
19 productivities of fish in the Mackenzie systems by
20 comparison with the Shield regions. Is that your point
21 of view? I suppose it must be.

22 A Well that is part of it.
23 I think that there is a climatological difference too
24 between the Mackenzie Valley and the Pre-Cambrian Shield.
25 So, I think that the growing season is somewhat longer.

26 THE COMMISSIONER: Carry on
27 Mr. Bayly. Sorry to interrupt you.

28 MR. BAYLY: Dr. McCart even
29 without a road, would you anticipate that with increases
30 in population, whether they be related to the pipeline

1
2 or spin-off activities, there is going to be some more
3 fishing pressure on North Slope Rivers.

4 A I expect probably that there
5 is, yes.

6 Q That may be true for other
7 rivers leading into the Mackenzie as well?

8 A That's probably true, yes.

9 Q Now, I realise in general
10 that with a pipeline buried under a stream, the long
11 term sedimentation, that is year after year, is unlikely.
12 But the only example we have to turn to in the Northwest
13 Territories at the present is the Pointed Mountain Line
14 and the crossing on the Kotaneelee River and that is
15 a crossing where sedimentation has occurred in more than
16 one year and repairs have had to be done. We had
17 evidence given at this Inquiry that gravel was scraped
18 up off the bottom of the stream and piled on top of the
19 line and my information is that that has become a
20 problem again this year and recently permission has been
21 given to recover this pipe again. I don't know whether
22 it will be in the same method. But given that kind of
23 situation, I assume we must face the possibility that if
24 something goes wrong in an engineering sense, that we may
25 get this increased, sorry, this siltation year after year
26 until the problem is solved if it can't be solved the
27 first time around. Would you agree that that is a
28 possibility?

29 A Well it is a possibility, yes.

30 Q All right.

Banfield, Hemstock, McCart.
Cross-Exam by Bayly

1
2 A Let's hope that it doesn't
3 happen.

4 Q Well we all hope that and
5 then we must assume that the builder of that pipeline
6 is using the best techniques available to do the repairs.

7 MR. MARSHALL: Well that may
8 be or may not be. There was some evidence about that
9 too. I think it indicated that perhaps the best
10 techniques weren't used. Mr. Owen was pretty strong
11 in some of his remarks I thought, about the appropriateness
12 of some of the techniques that had been used.

13 Q All right. That is ob-
14 viously a matter of argument. There are these possibilities
15 we must face in certain river crossings and I gather that
16 your assessment must look at not only the impact of
17 construction but the possible impact of this kind of
18 repair work causing siltation at different times of
19 year from construction.

20 For example, the repair work
21 on the Kotaneelee River appeared to be done during the
22 open water season when silt loads were presumably quite
23 low. It appeared to be after the flood, Mr. Owen's
24 evidence suggested this had been done. And that would
25 be something that someone like you would be asked to
26 assess the impact of that, I assume.

27 A Yes, obviously a situation
28 like that is liable to have, you know, some effect
29 downstream.

30 Q And this is the point of

Banfield, Hemstock, McCart.
Cross-Exam by Bayly.

1
2 fisheries, biologists monitoring, not only the pipeline
3 construction but monitoring operations and maintenance
4 as well.
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Hemstock, Banfield, McCart
Cross-Exam by Bayly

1 A Yes, I should point out
2 that that was obviously a very difficult crossing in
3 the sense it is very steep and that there are no stream
4 crossings quite like that on the North Slope which is
5 your area of interest.

6 Q Yes, I understand that
7 the only one that even approaches it would be Rapid
8 Creek with quite steep banks and a flood plain.

9 A But again, not quite
10 comparable to the Kotaneelee River.

11 Q I beg your pardon.

12 A Again not quite comparable
13 to the steepness of the hillsides at the Kotaneelee
14 River.

15 Q Yes and Dr. Hardy who
16 is witness for Arctic Gas, gave evidence on that parti-
17 cular crossing as I recall said that the river did
18 something there, we never thought the river would do,
19 and so we are faced with situations of rivers changing
20 courses or whatever in strange ways that even an
21 experienced man like Dr. Hardy is unable to predict.

22 A Well, let's hope we
23 benefited from the experience of the Kotaneelee River.

24 Q Yes. We're talking about
25 impact. Would you agree that we can break them down
26 into two categories and these are broad categories. One
27 is those that we can predict given that the pipeline
28 will be built in the way in which the engineers say it
29 will be built and there are other impacts that are very
30 difficult to predict. When the river does something that

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Cross-Exam by Bayly

1 nobody thought it would do or just using that as an
2 example. In other words, you as a scientist cannot
3 predict all the possible impacts. All you can do
4 is give to us and give to the applicant the general
5 impacts that are likely if everything goes well and if
6 things that are predictable go wrong.

7 A Yes, I think I pointed
8 out yesterday that we're assessing potential impacts
9 and that we want to be in a position to monitor the
10 actual impact of the pipeline after it's in place.

11 Q The one point I would
12 like you to clarify is when we're talking about
13 potential impacts. You must restrict yourself to those
14 things that are likely. Is that correct?

15 A Well, no. I like to--
16 there are some unlikely impacts with very low probabili-
17 ties which we've mentioned occasionally and other
18 people have brought up. We're most concerned about
19 the most likely impacts and we are aware however of
20 some rather unlikely circumstances which might occur.

21 Q Right. But being human,
22 not all of them. Nobody can predict all of the possible
23 impacts with this kind of a project. Would you agree
24 with that?

25 A Certainly.

26 Q Now, if we're talking
27 about impacts on fish and the monitoring after the
28 pipeline, if we assume, as the example that siltation
29 over spawning area causes the loss of some eggs, even
30 with monitoring, I suggest to you, and especially in

Hemstock, McCart, Banfield
Cross-Exam by Bayly

1 streams that are not clear, that are turbid there for
2 the period during which you can study them -- the open
3 water period. It will be difficult to assess this
4 for quite a long time. If it's possible to assess it
5 at all. It may be so minor that it makes no distinguish-
6 able difference but even if it is major, the difficulty
7 will be in the timing. We won't see a lot of dead
8 fish if the eggs are just covered up with silt.

9 A Well, if you're thinking
10 of grayling and Arctic char on the North Slope, I think
11 that you, in fact, can, if you wish to, in fact, assess
12 the mortality to eggs. There are techniques for doing
13 this and in the kinds of streams and in the kinds of
14 situations in which they spawn, we could do it all
15 right.

16 Q All right. Can you do
17 it given the way you estimate the population and I have
18 read this to you in the last panel out of the
19 Steigenberger Report that you had given him a conservative
20 estimate of the fish population which bracketed a large
21 number. You went from thirty to forty thousand, I
22 believe.

23 A What are you asking?
24 Initially I answered a question regarding mortality to
25 eggs.

26 Q Yes, now you've said that
27 you can assess the mortality to eggs but in order to
28 do that don't you have to have a pretty good idea of
29 what the population is?

30 A No. What you have to know

Hemstock, McCart, Banfield
Cross-Exam by Bayly

1 is where they're spawning and you go in using various
2 techniques to find out what the population of eggs in
3 the gravel is and you can count up the dead ones and
4 the lives ones and you can find out what proportion
5 are alive and what proportion are dead. If you know
6 something about the history of the area, sedimentation,
7 using a control area, you can determine within some
8 limit the mortality which might have occurred as the
9 result of sedimentation.

10 Q Yes, and if you move off
11 the North Slope into areas where the fish spawning
12 habits are still not clear, that becomes more difficult.

13 A In species, yes. It's
14 more difficult in some other areas, yes.

15 Q In the fact, you have
16 to know quite a lot about a population to know whether
17 it's decline or not. And perhaps a lot more about
18 some species than is presently known in the Mackenzie
19 itself.

20 A That's true, yes.

21 Q Now, on the question of
22 culverts, and using culverts to cross streams you have
23 given evidence on page 23 -- actually starting on page
24 22 -- saying there are two situations in which
25 serious obstructions to fish passage could arise as a
26 result of pipeline related activity. These are first at
27 culverts and second where berms are used at major river
28 crossings.

29 Now, you responded in
30 cross-examination from Mr. Gibbs to the reason why it's

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Cross-Exam by Bayly

1
2 more difficult for fish to use, in particular unbaffled
3 culverts than it is for them to use the natural and
4 uneven stream bottom to aid in their passage upstream
5 and of the three culverts you mentioned -- of the three
6 stream crossings that you anticipate putting in culverts,
7 would you anticipate putting in baffled culverts?

8 A I think we would prefer
9 obviously not to put in culverts at all but to use
10 bridges if necessary but I think we would be inclined
11 to go for elliptical culverts in which natural substrate
12 could be maintained.

13 Q So then the culvert
14 would sit below the bottom -- the bed -- of the river.
15 Is that what you're saying?

16 A Materials would be
17 incorporated into the bottom of the culvert yes.

18 Q Yes. Which would create
19 the natural kind of effect allowing eddies and --

20 A Yes.

21 Q -- slow areas for the --

22 A Yes. I don't particularly
23 like baffles because I'm not certain that -- you may
24 have considerable trouble with materials accumulating
25 inside the baffle culvert and also with ice.

26 Q Yes.

27 A So that I would prefer
28 to have some other solution to this problem.

29 Q Right. Now, elliptical
30 culverts have given some problems in some areas and we

Hemstock, McCart, Banfield
Cross-Exam by Bayly

1
2 have had evidence from that in the Aklivik , the
3 Ringling River crossing. By way of example is one where
4 elliptical culverts collapse. You are aware of that?

5 A Yes, yes. I have been
6 told that they were badly constucted. I don't know.

7 Q Yes.

8 A But they have been used
9 successfully. I think in other areas.

10 Q Right. But that is a
11 concern. You don't want your culvert to collapse.

12 A No. Certainly not.

13 Q That's not a complicated
14 question. And at the Ringling River, there are, not
15 only elliptical culverts, but there is also a fish
16 culvert. Are you aware of that one as well?

17 A No. What is a fish
18 culvert?

19 Q We have photographs of
20 it that are exhibits. I understand it is a culvert
21 that in this case which is at a higher level -- the
22 bottom of it is at a higher level than the bottoms of
23 the culverts that take the regular flow so that -- do
24 you understand that?

25 A Yes.

26 Q And I gather the theory
27 is that once the water reaches a certain level that
28 some of it will be diverted into the fish culvert which
29 will probably be moving more slowly than the river -- the
30 main body of the river going through the, in that case

Hemstock, Banfield, McCart,
Cross-Exam by Bayly _____

elliptical culvert. You are aware that sometimes then
that there are special culverts designed in this way,
are you?

A Yes.

Q This isn't a unique
situation. It happens in other places.

A It's not used very often
but I have seen references in literature to secondary
culverts for fish passage.

Q Right. Now, with regard,
not just to fish but also with regard to other aquatic
species, with regard to benthic invertebrates for example,
are you concerned with culverts and their behaviour?
Either because it will increase the speed of the river
and perhaps pick up more silt and deposit it downstream
or because of any other effects that might occur?

Banfield, Hemstock, McCart
Cross-Exam by Bayly

1 A I think you have to
2 construct the culverts so as to minimize the potential
3 for additional scour. It has to be placed in such a
4 way that you don't get this kind of thing. . You know,
5 as far as benthic invertebrates go, I'm not concerned
6 at all. I've seen no reference anywhere to the effects
7 of culverts on benthic invertebrates except of course
8 during the construction of the thing.

9 Q All right. Well, that's
10 during construction. I take it it's possible especially
11 with a road where you might have increase/siltation
12 caused by the fact that you don't revegetate a road.

13 A Oh, I think you should
14 revegetate roads if possible.

15 Q All right, I'm thinking
16 really of the Ringling River crossing where it's
17 actually part of the Dempster Highway, it's not
18 likely to be revegetated whatever we say, but in that
19 case you might get more silt than you would get in
20 a pipeline crossing.

21 A From the fact that
22 there is in fact a road there and materials might be
23 moving down the ditch, yes.

24 Q Now, my information from
25 my advisors is that, in fact, at that particular
26 crossing a quick and less than one-day survey of up-
27 stream and downstream of the crossing disclosed that
28 there were -- there was more evidence of invertebrates
29 upstream of the crossing than downstream.

30 A I'm sure that's true.

Banfield, Hemstock, McCart
Cross-Exam by Bayly

1 But you see to take the Ringling River example, which
2 is absolutely a worst case, how many culverts collapsed?
3 I must admit in driving along highways I have seen
4 very, very, very few collapsed culverts, so that, yes,
5 in that particular instance where the culvert collapsed,
6 materials that were above the culvert entered the
7 stream, the culverts had to be removed, they had to
8 be replaced, materials were moving down the roadway.
9 Of course you're going to get a diminution in the
10 populations of benthic invertebrates downstream of a
11 culvert which was a failure, and that's an extremely
12 large culvert. I don't think that we have any
13 intention of placing culverts of that size or culvert-
14 ing streams ^{of} the size of the Ringling River. We're talk-
15 ing about relatively small streams in each case, and
16 I can, frankly can't see how anything like the Ringling
17 River disaster, whatever you want to call it, which
18 would occur.

19 Q That was probably some-
20 thing that the engineers building that felt as well,
21 that it wouldn't occur.

22 A Well, I hope that
23 engineers have learned something from the collapse of
24 the culvert at the Ringling River.

25 Q One of the things they
26 seem to have learned, Dr. McCart, and perhaps you'd
27 want to comment on that, is to go to round culverts,
28 and I'm just wondering if benefitting from that exper-
29 ience at all, Arctic Gas would be looking at what they
30 are doing to reassess whether the oval shaped or

Banfield, Hemstock, McCart
Cross-Exam by Bayly

1 elliptical culverts that they're planning to use might
2 run into the same kind of problems --

3 A I think Mr. Williams
4 indicated that there's a possibility that Arctic
5 Gas might go in fact to Bailley bridges, which might
6 eliminate most of these problems.

7 Q But given that you
8 might -- and you started your answer with that -- I
9 realize that bridges might turn out to be a much
10 better solution than culverts from an engineering point
11 of view, but should it be that there are culverts,
12 I'm just suggesting to you again, an example we have
13 in this country of elliptical culverts is of what
14 you have described as the Ringling River disaster.
15 I'm just suggesting that you as an aquatic biologist
16 might want to suggest that the concern would be to
17 make sure you get the best culvert, whether it's
18 round or elliptical.

19 A I repeat it's possible
20 to use round culverts in these situations as long as
21 you can be assured that velocities within the round
22 culverts are within the swimming performance capa-
23 bilities of the fish that are likely to be moving
24 upstream. In other words you obviously have to size
25 the thing so it can carry the water at a velocity which
26 is low enough for the upstream passage of fish.

27 Q That's the advantage
28 that the elliptical culvert has, that it provides a
29 wider surface area, or a wider area --

30 A It provides resting places

Banfield, Hemstock, McCart
Cross-Exam by Bayly

1 and eddys and things like this in that the bottom can
2 incorporate stream bottom materials, rocks and things
3 of this sort.

4 Q Yes.

5 A In fact, it's possible
6 to place these things in there.

7 Q Would you do that in
8 the winter, or after the flood?

9 A I don't know what the
10 plan is.

11 Q Have you been doing any
12 experiments on the possible effects of methanol and
13 high silt loads together? The reason I suggest that
14 is, I envisage the possible situation of a methanol
15 spill out of something like a bladder tank that
16 might end up on or under ice and might get trapped
17 and might not be released until the springtime, if it
18 couldn't all be cleaned up.

19 A No.

20 Q So you don't know
21 whether we would be faced with what Dr. Banfield
22 called a synergistic effect, or whether there would
23 even be a concern?

24 A Well, one would expect
25 that if an egg were under stress from one cause, and
26 there was an additional problem, that there might be
27 a synergistic effect. That would be additive.

28 Q But that's as predictive
29 as you can be in this situation, that it might be but
30 it's not something that we have more knowledge than that?

Banfield, Hemstock, McCart
Cross-Exam by Bayly

1 A Yes, we have not examined
2 it.

3 Q Yes. Would you be recommend-
4 ing that that sort of thing be examined?

5 A No.

6 Q Now, on page 28 of your
7 evidence, the fourth paragraph, third complete para-
8 graph on the page, third sentence, I shall read the
9 paragraph itself:

10 "The applicant expects few, if any, ruptures
11 will occur. Thus the probability that a
12 sizeable leak will occur is small and the
13 probability that such a leak will occur in
14 the vicinity of an area critical to populations
15 of fish is even smaller. Nevertheless, the
16 applicant has developed contingency plans to
17 control flows of the test fluid should
18 ruptures occur."

19 Now, going back to the last answer that it's possible
20 that there may be synergistic effects of the combination
21 of silt loads and methanol that gets spilled, have you
22 worked out contingency plans to clean up methanol that
23 is spilled, even if it gets either into bodies of
24 water, or under or on top of ice?

25 A My understanding is
26 that Canadian Arctic Gas will have contingency plans
27 to deal with methanol spills, should they occur.

28 Q And will you be part
29 of the planning team on those?

30 A We might.

Banfield, Hemstock, McCart
Cross-Exam by Bayly

1 Q Because there are -- it
2 may not occur with methanol but if you take example -
3 take the example of a spill of lubricating oil into the
4 water. Now I don't mean even a great one, but perhaps
5 a barrel of it gets pushed in by a caterpillar and
6 ruptured and it spills in. One of the ways of getting
7 rid of that is to disperse it with a chemical dispersant.
8 Is that true?

9 A Yes, but it certainly
10 isn't the method that I would recommend.

11 Q Well, that's why I'm
12 interested in whether or not you're going to be part
13 of the team that works on the contingency plans because
14 you may be, from your point of view, very interested in
15 the kinds of contingency plans with regard to their
16 effects on aquatic species.

17 A I'm sure we will be
18 asked to comment on any contingency plans which have
19 to do with water, with the possibility of any kind
20 of toxic material entering water.

21 Q I take it although this
22 is not in the area of a contingency plan, but you
23 would be asked about the discharge of any treated or
24 untreated sewage at whatever time of year into water
25 bodies from your point of view?

26 A Yes.

27 Q And even if that got to
28 the contingency plan stage --

29 A Wait a minute. You know,
30 we don't have contingency plans for sewage disposal.

Banfield, Hemstock, McCart
Cross-Exam by Bayly

1 We have a plan for disposing -- or will have at some
2 point during the final design stage -- a plan or a
3 method of disposing of these sewage effluents which I'm
4 sure will have to be approved by some governmental
5 regulating body.

6 Q Well, that happened in
7 Alaska, according to Mr. Lawrence, yet the facilities
8 were still under design, and that's why I'm concerned
9 with the possible need for contingency plans. I realize
10 you will learn from the Alaskan experience.

11 A Yes.

12 Q And have learned from it.
13 Nevertheless, we are faced with the situation where
14 contingency plans would have been very useful and
15 may still, if something goes wrong. You'd agree
16 with that?

17 A That there should be a
18 contingency plan for sewage disposal should something
19 go wrong.

20 Q Yes.

21 A Yes, I would agree that
22 you should have something in mind. You should be aware
23 of what things could go wrong in your design for
24 sewage disposal, you should take this into account.

25 Q All right, because it's
26 possible and conceivable that you might get a phone
27 call in the middle of the night during construction
28 saying that the sewage plant or the lagoons had
29 broken open and they wanted to know what to do to
30 make sure that it didn't hurt any fish that -- or other

Banfield, Hemstock, McCart
Cross-Exam by Bayly

1 aquatic species that might be in the stream or surround-
2 ing bodies of water, and so you'd want to be able to
3 give them some do's and don'ts, I assume.
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Banfield, Hemstock, McCart
Cross-Exam by Bayly

Q Yes.

MR. MARSHALL: I think Mr. Bayly that Mr. Lawrence did testify about a back-up in the camps that they would be a sewage treatment modular plants and there would be a back-up to that in the event there was some failure in the plant.

MR. BAYLY: I realize that, sir, and this is obviously one of the things that has been learned from the Alaskan experience. This is also the evidence of --

There is also the evidence of Mr. Williams that in certain smaller camps there may not be this dueling of facilities and there may be concerns there which are not as great in terms of magnitude but qualitatively they may be just as important.

Along the coastal areas, you have given evidence in cross-examination that there are important areas for aquatic species feeding in the summer, those coming out of the Mackenzie often go along the Yukon coast and is the area of Babbage Bight one of these areas that --

A I think during the course of the ice freezing season that almost all of the coastal areas would be utilized by one species or another.

Q All right. I understand from the evidence we heard from Dr. Lewis that the area of Babbage Bight is a potential deep water harbor area and is that also a wintering area for any fish to your knowledge?

Banfield, Hemstock, McCart
Cross-Exam by Bayly

A I would expect, not to
my knowledge, no.

Q By taking a minute I
can probably make it shorter.

THE COMMISSIONER: All right
then. We'll adjourn for coffee.

(PROCEEDINGS ADJOURNED FOR A FEW MINUTES)

(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

MR. MARSHALL: Mr. Commissioner,
perhaps before Mr. Bayly commences his -- re-commences
his cross-examination I should comment on a draft
schedule that Mr. Waddell has been circulating. He has
asked us to comment on it, suggesting some hours of sitting
in the sessions in December. I'm afraid, sir, that we
don't find that acceptable. He has, I note, suggested
sitting Saturdays and as well, he has suggested that we
commence Mondays at 12:00 and sit through to 6:00. I
think that puts too much of a strain on both witnesses
and counsel who have to try to prepare cross-examination
and while we're in your hands about the hours of the
Hearing, sir, we would much prefer a little later start
on the Monday such as we've been accustomed to and not
sitting on Saturdays. We're content to sit morning and
afternoon sessions all through the week including Friday.
If it's thought necessary to make up a few extra hours
we would be happy to start sharp at 9:00 and have coffee,
stop to bring in coffee if you like and continue the
hearings through the morning and afternoon if Mr. Waddell
is anxious that we find some additional time but we

Banfield, McCart, Hemstock
Cross-Exam by Bayly

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2 have a little trouble with the Saturday sitting and the
3 12:00 start on Monday, sir. I thought I should mention
4 that as he had asked for some comments.

5 THE COMMISSIONER: Does anyone
6 else have any comments?

7 MR. RYDER: Well, I'm inclined
8 to agree with Mr. Marshall on this instance. It seems
9 to me that we are indeed making reasonable progress through
10 Phase Two and Phase Three as it is and it is an important
11 area. It's the area now where we're getting into the
12 real terms and conditions and I think if we had more
13 time to prepare or leave a reasonable quantity of time
14 for preparation for our efforts at the Inquiry,
15 that could be one of the better -- one of the ways
16 in which we can assist you in getting through this
17 phase in a reasonable time. I agree with Mr. Marshall
18 that Saturday sittings and lengthy Monday sittings --
19 that portion of Mr. Waddell's proposal is excessive and
20 I would like to avoid Saturday sittings where possible.

21 MR. BAYLY: Mr. Commissioner,
22 my only comment would be to try and avoid evening
23 sitting if possible and I find that I need that time
24 to prepare or even just to recharge my batteries.
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Banfield, Hemstock, McCart
Cross-Exam by Bayly.

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2 THE COMMISSIONER: I think your
3 all probably right, by trying to sit in the evenings,
4 as well as in the mornings and the afternoons. I may have
5 been pushing everybody too hard and certainly is very
6 difficult for the official court reporters and the
7 typists. We tend to forget about them. We think only
8 of Counsel and the witnesses but they don't finish until
9 the early hours of the morning when we sit late.

10 So, I think I will go along with
11 the suggestion you have made Mr. Marshall and Mr. Ryder
12 and we'll sit three weeks in December, the week of
13 December 1 to December 8 and December 15 and each
14 Monday we will sit from 1:00 until 6:00. Then have
15 morning and afternoon sittings each day, including
16 Friday, according to the hours Mr. Waddell has layed
17 out in the schedule.

18 And we won't sit Saturday,
19 December 6 or Saturday December 13th and we will adjourn
20 December 19 at-- Friday, December 19th at 11:00 A.M.
21 I think that that schedule has been circulated and
22 everybody has it. If I try to work in an evening sitting
23 somewhere during that time, you can all remind me what
24 I said just now.

25 MR. BAYLY: Mr. Commissioner,
26 while we are on matters of scheduling etc., nothing has
27 been said in response to your question concerning the
28 possibility of a cross-section of experts on caribou
29 and as far as I am concerned and my instructions are
30 that we would like to see that as an experiment to see if

Banfield, Hemstock, McCart
Cross-Exam by Bayly

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2 that is as good or a better method of dealing with the
3 subject and I am informed by Mr. Anthony that he agrees.
4 I didn't want it to die just because nobody said anything.
5 I don't know how the other Counsel feel about that.

6 THE COMMISSIONER: Do you have
7 a position of that Mr. Marshall? I was leaving this to
8 Mr. Scott really.

9 MR. MARSHALL: I had had some
10 preliminary discussions with Mr. Scott and I had
11 gathered that it was a possibility for some later stage
12 in phase three, after some of the formal evidence has
13 gone in, I would like another opportunity to discuss
14 it with him sir and my client.

15 THE COMMISSIONER: All right.
16 Well, I thank you Mr. Bayly and I would like to see it.
17 In fact, I am going to be seeing Mr. Scott next week
18 and I am going to express emphatically as I can, my
19 desire to see that experiment tried. And I think in
20 relation to caribou it would be worthwhile. I had
21 thought it might also be worthwhile in relation to the
22 fascinating subject of frost heave but that may be more
23 difficult to arrange.

24 MR. BAYLY: Mr. Bell indicates
25 that he would support that experiment as well sir.

26 THE COMMISSIONER: That's good
27 to know.

28 MR. BAYLY: Dr. McCart, just a
29 few more questions before we finish talking so formally
30 to each other.

Banfield, Hemstock, McCart.
Cross-Exam by Bayly

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2 Last week we talked about the
3 gravel mining operations on active flood plains in the
4 Sagavanirtok and other rivers that Alyeska has been
5 borrowing material from. And what I want to ask you is
6 whether you are aware of any studies being done to follow
7 up effects of gravel mining from active flood plains on
8 that project that would benefit this applicant in
9 determining whether that is environmentally the most
10 acceptable or unacceptable source?

11 A No, I am not aware of any.

12 Q And will you be looking into
13 that in order to determine whether they have done a
14 monitoring project or are doing one?

15 A There is a monitoring team,
16 of course. We will be interested in seeing what they
17 produce in the way of documentation.

18 Q Yes. And with regard--
19 Now you were in on the pre-construction work in Alaska.
20 As I understand, your fish studies provided baseline
21 data that was useful to the Alyeska applicant. Am I
22 correct in that?

23 A Yes, for the North Slope
24 portion of the route down to the Ivishak River, I
25 should point out, and not north of that point.

26 Q Right.

27 A So, we did not do studies
28 from Ivishak to Prudhoe Bay in northern-most forty or
29 fifty miles of the route.

30 Q Where you did do studies, do

1
2 you feel that the data that you provided would give the
3 monitors sufficient information to be able to tell whether
4 in fact operations like gravel mining in active flood
5 plains, are actually having a bad effect or a detri-
6 mental effect to the fish populations or the populations
7 of other aquatic species?

8 A In certain areas, it would.
9 But it wasn't-- The study that we did was not set up
10 to provide baseline data for/^amonitoring study. In those
11 situations you need extremely detailed data and ours
12 was more of a survey nature. We were interested in
13 large coverage rather than in obtaining extreme detail
14 in particular areas.

15 Q All right. Now, can we
16 distinguish that aspect of the work, that it is anti-
17 cipated that you will have done and will be doing for
18 the Arctic Gas people, that they be able to use it in
19 monitoring more effectively than you anticipate could
20 be-- that could be used in the Alaska work you did?

21 A Yes, we have two areas where
22 we are attempting to get sufficient data on fish
23 populations, benthic invertebrate populations and to
24 some extent periphyton populations so that this can be
25 used as baseline data for monitoring as development
26 proceeds.

27 Q Yes, because I invite you
28 to agree with me that one of the problems is to deter-
29 mine what causes something. There is no sense stopping
30 mining gravel on active flood plains if the actual cause

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2 of a drop in populations is because you didn't have
3 enough information in the first place about say the
4 life cycle or somebody else was doing something that was
5 causing the damage. Those are the kinds of worries you
6 have. You don't want to correct something that wasn't
7 wrong in the first place.

8 A I don't quite follow your
9 argument.

10 Q All right.

11 A If you could repeat that.

12 Q If you are producing data
13 which is useful for monitoring, the situations that you
14 have to be able to cope with are not only the obvious
15 ones. For example, the pipeline is put into the ditch
16 and-- Oh, sorry a gravel mining operation is a better
17 example. The berm breaks and silt obviously can be seen
18 going down and you can follow it with a helicopter or
19 on foot and you can see some of the silt depositing
20 itself on a spawning area. You can say, we know what
21 caused the drop in the egg productivity this year,
22 because we saw it happening.

23 There may be either natural
24 things or things caused by other people, other projects
25 that damage fish populations and you have to be able
26 to put that in the mix so that you don't say what we
27 did was wrong necessarily, but it's either a natural
28 phenomenon or it's something that happened, say to the
29 char when they were out in the ocean. Do you agree with
30 that, that those things have to be taken into consideration

Banfield, Hemstock, McCart.
Cross-Exam by Bayly.1
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when your looking at causes, looking for causes of
damage to fish populations?

Banfield, Hemstock, McCart
Cross-Exam by Bayly

1 A Yes, as I understand what
2 you're saying.

3 Q And it's very difficult
4 to attribute declines in populations to a specific
5 event unless you can actually see the damage being done,
6 or trace it back to a cause.

7 You can extrapolate,
8 perhaps, but you can't always trace it back to a
9 specific cause.

10 A That's true, you can't
11 always trace it back to a specific cause.

12 Q You may be able to trace
13 it back to a kind of cause without knowing the
14 specific source of that cause.

15 A You may, you may, but
16 obviously you know, this is all very hypothetical.

17 Q But this is why, for
18 example, life cycle studies are so important. If
19 there is a regular cycle that causes the decline in
20 a fish population every 50 years, I analogize perhaps
21 to the cycle of the life of rabbits in some areas
22 where they reach peak populations and then drop off
23 dramatically. You want to know that as a natural
24 phenomenon before you go panicking that something you
25 have done has caused this to happen.

26 A Yes, but there are two
27 difficulties of course. You can't study a population
28 for 50 years before you do something in the vicinity
29 of the population, and secondly, you have the problem
30 that you can't study every population. You can only

Banfield, Hemstock, McCart
Cross-Exam by Bayly

1 study a representative sample of populations and there's
2 no guarantee, of course, that you can generalize every
3 aspect of their life cycle from one area to another.

4 Q All right.

5 A But the best you can
6 do is study representative populations over a period
7 of time and hope that you can extrapolate.

8 Q I'm not criticizing the
9 program in any way on account of that, Dr. McCart.
10 I'm just trying to show that you are given parameters
11 within which to work -- perimeters, I would say, in which
12 to work, and they are time, money, the fact that you
13 can't study everything, and you can't predict the
14 unpredictable.

15 A Can I point out that
16 you know, in doing science, you always have available
17 to you a body of information that people have gathered
18 in other areas, and on the basis of studies of fish
19 done in other areas, Arctic char are a fish and they
20 have many of the characteristics of fish in general,
21 and we can say an awful lot about what we can expect
22 of an Arctic char population, on the basis of what is
23 available in the literature on that species and other
24 similar species, or even species which are quite
25 dissimilar.

26 Q I can appreciate that
27 and when you see a population of trout declining in
28 a stream that's crossed by a road in Southern British
29 Columbia, then you can say, "Well, the chances are that
30 it's being over-fished at the wrong times of year,"

Banfield, Hemstock, McCart
Cross-Exam by Bayly

1 and if that happens on the North Slope then we can
2 expect that to have a significant impact. That's
3 the sort of example of that kind of thing that you
4 mean, would you agree?

5 A Well, it's possible that
6 you could look at a stream and assume that it's being
7 over-fished if crossed by a road.

8 Q Beg pardon?

9 A Your example is a
10 possibility, yes.

11 Q Yes, and as a matter of
12 fact it's one of the things that leads you to the
13 concern about roads, that and siltation caused by them
14 and --

15 A Yes, right.

16 Q -- and it's not because
17 you've built a road across the North Slope, it's
18 because you've seen other roads and their effects on
19 other fish populations.

20 A Yes.

21 Q Now, some of the other
22 effects of damage may not hurt populations directly,
23 but may limit their use and one of the suggestions I
24 will make to you is this, that a substance may escape
25 into water, say an oil product, and its effect on
26 fishes, the fish themselves and their life may be
27 small, but it may be possible that it may have some
28 effect on the taste of the fish to the people who
29 consume it. Do you see that as a possible impact of
30 damage caused by spills of many substances?

Banfield, Hemstock, McCart
Cross-Exam by Bayly

1 A That has happened in
2 other areas.

3 Q All right, and this has
4 been raised by the people in the delta area, not
5 specifically with your project but with the Beaufort-
6 Delta study, to find out whether any of the things
7 that may happen, may cause food resources they use to
8 become unpalatable, and what I'm going to ask you is
9 whether or not you've been doing any experiments to
10 see whether in fact the introduction of certain materials
11 that will be used on this project, on a sample population,
12 will affect the taste of char or grayling or some of the
13 other fish? The whitefish or cisco that are --

14 A No, we haven't done such
15 experiments but in this particular instance I don't
16 see that there would be sufficient volumes of any
17 chemical to detrimentally affect populations of fish.

18 Q All right, but if we look
19 at it in the context of creating a corridor down which
20 an oil pipeline may go, and look at the remote possibil-
21 ity of either a moderate or great spill, we may have
22 to face that as a possible impact.

23 A I'd say that there is a
24 remote possibility that taste might be affected in
25 certain localized areas.

26 Q And does that hold true
27 with the contingency operations to clean up, some
28 of the dispersants, for example, that might be used
29 that would have any affect on the taste of -

30 A I don't know that the

Banfield, Hemstock, McCart
Cross-Exam by Bayly

1 contingency plans contain any suggestion that disper-
2 sants will be used to clean up anything that's likely
3 to ~~be~~ spilled as a result of the operations, the con-
4 struction or operation of ^{the} gas pipeline ..

5 Q All right. Now that is
6 because we haven't got to that stage, or because you
7 would recommend against the use of dispersants.

8 A I'd recommend against
9 the usage of dispersals. I would be in favor of
10 mechanical methods of cleaning up spills of anything.

11 Q Are you aware that that
12 was a great issue with the fishermen in the inland
13 Sea of Japan when they had that great oil spill, as
14 to whether or not dispersants should be used?

15 A Well, I am aware that
16 this is a consideration in most oil spills, whether
17 one should use dispersants or what methods should be
18 used, and I'm also aware that in many instances the
19 conclusion is that the dispersant has caused more
20 damage than the spill itself.

21 THE COMMISSIONER: So you're
22 in favor of collecting it by mechanical means?

23 A Yes, in most instances,
24 yes. There may be some circumstances, of which I'm not
25 aware, where dispersants may be a preferable method.

26 WITNESS BANFIELD: There are
27 other methods and two have been mentioned, and if you
28 go as far as Japan, permit me to go as far as France,
29 and there they use chalk to disperse or to collect
30 the oil from marine spills, and it is far more

Banfield, Hemstock, McCart
Cross-Exam by Bayly

1 successful and less damaging to the environment.

2 THE COMMISSIONER: Do you mind
3 telling us a little more about that? Using chalk,
4 forgive me, I'm not -- what do they do?

5 A May I back up a bit and
6 perhaps --

7 Q Yes, yes, please do.

8 A It has to do with the
9 "Torry Canyon" spill off the coast of Cornwall in 1968
10 or '67 and the British efforts were highly unsuccessful.
11 They bombed the / "Torry Canyon" when it still contained
12 50,000 tons of oil, and tried to burn her
13 with naphan, but it still didn't work, and they
14 spread about as many tons of dispersant on the oil
15 as there were tons of oil and from this the world
16 learned that detergents were, as Dr. McCart suggested,
17 the cure was worse than the affliction. It wiped
18 out the literal zone, the beach zone flora and fauna
19 quite effectively. This great oil spill travelled
20 southward behind a north wind and soon reached the
21 coasts of Brittany, and the French there attacked it
22 with chalk, a mechanical method, and they had far
23 more success in settling the oil than the British had,
24 and the damage on the coasts of Brittany were a lot
25 less. They also had a vessel with a boom that managed
26 to collect, actually scoop up I think it was 1,200
27 tons of oil in rather short time.

28 Q Just while we have
29 managed to slip away from the North Coast for a moment,
30 there's a book that has been very widely read on the

Banfield, Hemstock, McCart
Cross-Exam by Bayly

1 effect of the super tanker traffic around the world,
2 and it contains a good deal of discussion of oil spills
3 in the ocean. It's called "Super Ship" by Noel Mostoert
4 I just wondered if you, Dr. Banfield, had any views
5 on the book? Someone on this panel suggested, talked
6 about dooms day writers, maybe that was you, I don't
7 remember.

8 A Sorry, sir, it was I.
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Banfield, McCart, Hemstock
Cross-Exam by Bayly

Q If you have no comment
on Mr. Mostoert's ^{book} / that's fine, I'm just --

A No, I have not read it.

MR. BAYLY: Perhaps we can
get him to come back again the week after next.

THE COMMISSIONER: Read it
on the plane when you go back to Scotland and no doubt
they will bring you back again and you can answer the
question.

A "Super -- may I have the
title again?

THE COMMISSIONER: "Super Ship".

A "Super Ship."

THE COMMISSIONER: I'm sure
it's available in every airport you'll be stopping at
on your way except the Yellowknife one.

Q I realize we will be
dealing with delta and cross delta matters at a later
phase, Dr. McCart but I'm wondering -- we don't have
anyone on this panel representing the sea mammals, the
whales and the seals but in particular the whales
because their breeding ground is very close to the
area of the cross-delta route. Will we be able to
expect that there will be somebody who has done studies
in this area giving information in the cross-delta
panel? Perhaps Mr. Hemstock could answer that better
than you, sir.

WITNESS HEMSTOCK: Yes.

THE COMMISSIONER: Who will it

Hemstock, Banfield, McCart,
Cross-Exam by Bayly

be?

WITNESS HEMSTOCK: A I'm

not sure. Despite numerous disagreement between Mr. Jakimchuk and Mr. McCart. I think it falls on Mr. Jakimchuk's field. We will probably use Slaney who has done detailed studies for the producers.

Q That would be where he would be appearing too, would it, Mr. Hemstock, in the cross-delta portion?

MR. MARSHALL: We haven't got to the point yet where we need firm decisions about all the witnesses that are going to be called on cross-delta nor do I know from Mr. Ballem what witnesses he is intending to call. Mr. Bayly, we'll have some information on that a little later.

Q Now, I don't intend to try to pin the applicant in this Hearing down to calling a particular witness, Mr. Commissioner. My only concern is that this area will be covered.

When I was talking, Dr. McCart, about your knowledge of the Babbage Bight area, I neglected to mention the other side of the delta and an area of concern for people at Tuktoyaktuk is their own harbour. One of the possible plans we heard for the shipping of some material anyway especially if it were to come from Japan or even the West Coast of North America would be that some might come into Tuk harbour as a staging area. That might involve dredging that harbour in order to make it acceptable to ocean going

Hemstock, McCart, Banfield,
Cross-Exam by Bayly

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2 vessels. We've heard from Dr. Lewis that in his opinion
3 that is a harbour which would cause a lot of problems
4 but we didn't hear from him very much about the fish
5 and their habits in that area. Do you have any comments
6 on fish spawning or feeding in the Tuk harbour?

7 WITNESS McCART: A No,
8 I would say however that this is the first I have heard
9 of the proposal to use Tuk harbour. And we have
10 not done any studies in that area.

11 THE COMMISSIONER: Well, to be
12 fair it was Foothills -- one of the proposals was by
13 Foothills to bring 35,000 ton tanker loaded with fuel
14 oil into Tuk harbour to provide fuel oil to the
15 construction crews and equipment on the pipeline. I
16 have forgotten the other proposal.

17 MR. BAYLY: I believe it was
18 Mr. O'Rourke as well, Mr. Commissioner, who admitted the
19 possibility of some of the material coming in that way
20 and then being transferred to vessels that could take
21 it up river at least to a certain extent.

22 THE COMMISSIONER: That's right.

23 MR. BAYLY: So in that sense,
24 sir, there is the possibility that the applicant would
25 use that as a portion of its staging area.

26 You haven't studied that
27 yourself, sir?

28 A No, I haven't studied it.
29 If it were suggested, presumably we would be asked to
30 look at the situation at Tuk harbour but as I say this

Hemstock, McCart, Banfield
Cross-Exam by Bayly, Ryder

1 is the first I have heard of it.

2
3 MR. MARSHALL: I think it is
4 not part of the plan. It was just mentioned this was
5 one possibility. Mr. Blair mentioned that some possi-
6 bility of the use of Tuk harbour too, I believe
7 in connection with something in the future.

8 MR. BAYLY: Well, I'll take a
9 run at Foothills fish people on that, Mr. Commissioner.

10 MR. BAYLY: Those are all the
11 questions I have on this subject, Mr. Commissioner.
12 Thank you very much.

13 THE COMMISSIONER: Mr. Ryder?

14 CROSS-EXAMINATION BY MR. RYDER:

15 Q Thank you, Mr. Commissioner.
16 Before leaving that topic that Dr. Banfield raised,
17 Dr. McCart of the method used by the French to deal
18 with the oil spill from the "Torry Canyon", he mentioned
19 chalk, and he then said that it was useful in settling
20 the oil to the bottom of the ocean. Now, can you comment
21 on that and are there certain difficulties with that
22 in say the Mackenzie River?

23 WITNESS MCCART: A Well,
24 let me make a general comment first of all. I have not
25 seen. We expect that we would be in a position to
26 comment on any detailed contingency plan regarding spills
27 of this kind.

28 The other thing is, of
29 course, you are not going to get crude oil spills as
30 far as I can see associated with the gas pipeline. I

Hemstock, McCart, Banfield
Cross-Exam by Ryder

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2 have not myself made a detailed investigation of the
3 various methods of dispersing these things. I would
4 expect however that if you're settling out crude oil
5 with chalk that you are going to blanket the bottom and
6 it might have detrimental effects on benthic inverte-
7 brates and if there are alternative means of making
8 up a clean up I wouldn't particularly favour this
9 particular method of settling it out on the bottom.

10 Q And I understand, Dr.
11 Hemstock, that that's a subject that we're going to
12 get into in greater detail up in the delta?

13 WITNESS HEMSTOCK: A Yes.

14 Q All right. Well now --

15 THE COMMISSIONER: I think
16 we all realize that if the gas pipeline ruptures, it's
17 gas that's going to come out of it and not oil but
18 vast quantities of fuel oil require to be shipped and
19 trans-shipped and then handled and the amount of fuel
20 oil required is perhaps exemplified by Foothills propo-
21 sal to bring in a tanker loaded with fuel oil to Tuk
22 harbour so I only mention this because it's come up
23 in the communities. People are worried about oil as well
24 as gas and their concerns are not wholly unrelated to
25 the gas pipeline proposal in view of the quantities of
26 fuel that will be used. At any rate, please carry on.

27 WITNESS HEMSTOCK: Well, I might point
28 out that there is already contingency equipment at
29 various sites along the Mackenzie: Hay River, Simpson,
30 Norman Wells, Darcy and Tuk. And that there are

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They have slick-lickers, they have absorbent materials and the major effort is at trapping and preventing wide-spread spill. That's the first approach. Now, that would, that contingency planning and I think contingency equipment will simply be expanded as required if the gas pipeline is to go ahead.

MR. RYDER: Getting back to you, Dr. McCart, I wonder if I can refer you to the movie that Dr. Gunn showed us on Tuesday of this week and as I watched the movie, it seemed to me that he was describing the three types, or the various types of research necessary to protect the environment and to minimize impacts to the environment, as caused by this project and I wonder if I could just discuss these techniques or these types of research in general terms review insofar as it applies to your attempts to minimize the impacts on fish and as I saw the movie, it appeared that the first level or the first type of research was directed to gathering baseline information. Information as to where the fish are and where they spawn and their movements and their, the species that are in one place as

McCart, Hemstock, Banfield
Cross-Exam by Ryder

opposed to another and their numbers. Now, did I appreciate that movie correctly? Is that the first -- ?

A Well, that is one of the things that was done, certainly.

Q Right. And that's the first area of research that --

A It may be. I don't know what the other two that you're going to mention are. Possibly if you gave me a quick rundown on the three of them then we could --

Q I don't want to spend much time on this but I just want to place your research in this general methodology.

The second type is really two-fold and that's designed to determine how the activity is, how the pipeline construction activity is going to alter the habitat, alter the environment -- what changes are going to take place. And that's linked with some experiments to determine the tolerance levels of fish and birds to noise or to changes in their environment. And you recall those, the pictures of the experiments which attempted to simulate the noise of compressor stations and they watched the birds to see how they were affected and what noise level they were affected.

So that's the second level or the second type of research?

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1 A In that case it would
2 be the methanol experiment.

3 Q Yes, that's a good example
4 of the second level, the second type of research that
5 applies to fish. Now then, the third level, the third
6 type, is the design of methods, I suppose mostly be
7 engineers, which are intended to bring the impact
8 within acceptable limits, and you determine what the
9 acceptable limits are in the second stage, so then you
10 can tell your engineers what design levels he should
11 work towards, in order that the impacts will be within
12 the limits that the fish or the birds can tolerate.

13 A That's what you hope
14 to do, yes.

15 Q So have I, and perhaps
16 over-simplified, but have I set out the three generally,
17 the three types of research that takes place in a
18 program of this kind?

19 A Well, two types of
20 research and the final thing would be results of
21 your research hopefully. Now I point out that the
22 third of your aims there is sometimes very difficult
23 to achieve.

24 Q You mean that it's
25 difficult sometimes for the engineer to come up with
26 a device which will meet your standards?

27 A No.

28 Q Meet your problems.

29 A It's difficult sometimes
30 to establish objective quantitative standards.

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1 Q As to the tolerance
2 levels of --

3 A Yes, yes.

4 Q But until you do that,
5 isn't it hard for the engineers to know what to design
6 to?

7 A Well, I think you know
8 the example of sedimentation is one that we've gone
9 around and around.

10 Q I know that's a bad
11 example for this methodology because, and so I'd
12 rather leave that aside. The methanol test seems to
13 me the kind of example which illustrates the stages
14 of a research program, which ultimately leads to an
15 engineer's solution, which is acceptable to the
16 biologist.

17 A Yes, that's a good
18 example.

19 Q Now, am I right in say-
20 ing -- and I don't say this in any critical sense
21 because I recognize that, in large measure you and the
22 other biologists on your panel, are pioneers in this
23 endeavor -- but am I right in saying that the emphasis
24 which you have placed and the emphasis which the
25 government, in their fisheries experiments have placed,
26 relates to the first, essentially to the first level,
27 the first type of research, that is gathering baseline
28 information?

29 A Yes, I'd say that that's
30 so. Mind you, we have done methanol experiments.

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1 One of the other things that hasn't been mentioned
2 here is we have looked at the oxygen tolerance of
3 Arctic char to find out just how they react to that
4 sort of thing, so we have done some of this kind
5 of work at the second level; but it is true that our--
6 most of our work has been in the assessment of what's
7 there.

8 Q All right, and dealing
9 with the second level, it strikes me as a layman that
10 Alaska -- and Mr. Bayly mentioned this in passing --
11 that Alaska provides a laboratory, really a living
12 laboratory of -- that permits you to determine what
13 the stress levels are and that permits you to determine
14 what changes in the environment will occur in many
15 activities which are going to be duplicated in your
16 project.

17 A Yes. You're speaking
18 of the Alyeska Pipeline?

19 Q Yes.

20 A Yes.

21 Q Even though in Alyeska
22 they're having -- they've concentrated on summer
23 construction and you're doing winter construction, there
24 are many activities which may yield useful solutions
25 to us.

26 A Yes.

27 Q And as I look through
28 your reports, I just didn't see many, or any, I don't
29 think, that indicated that you had gone to Alaska and
30 for example in Alaska they are taking gravel from

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1 flood plains and you will be doing that here, and I
2 was wondering, it just strikes me that that would be
3 a place to go to determine in the field, what effects
4 that activity has on fish, and I was wondering if that
5 was intended or why you haven't done that?

6 A We have made several
7 proposals to do work on the Alyeska line to assess the
8 effects of the Alyeska construction, and Alyeska has
9 not looked with favor on our going over and doing this
10 kind of study, and we have not in fact been given
11 permission to do these, and so we haven't.

12 Q So it's a question of
13 you'd like to do it if it could be arranged?

14 A Yes.

15 Q I was wondering then if
16 I could ask you, Dr. Hemstock, if arrangements are
17 possible?

18 WITNESS HEMSTOCK: I'm not
19 sure that arrangements are possible. It would appear
20 that Alyeska has dozens or perhaps hundreds of
21 people looking over their shoulder, and they're not
22 particularly interested in having somebody else from
23 Canada to do that, and so it's -- I think it's very
24 difficult to try and arrange that sort of thing.

25 THE COMMISSIONER: Well, the --

26 A It seems to me that there
27 is perhaps a much more 'fertile field right in Canada,
28 where highways have been built along the Mackenzie
29 River and the Dempster/^{Highway} has been put in. Air fields
30 have been built along the Mackenzie and wharves and

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1 docks, and those things can be monitored and perhaps
2 that's the place that monitoring should be done rather
3 than in Alaska where there's a very different operation.
4 It's a summer operation and it's really not at all
5 like the gas pipeline.

6 MR. RYDER: Well, we do know
7 that there are many activities in Alyeska that are
8 similar to the ones proposed here. To my way of thinking
9 and I'm certainly not an engineer or biologist, --

10 A I'm not sure that there
11 are many that are similar.

12 THE COMMISSIONER: Well, let's
13 just pause for a minute. Alyeska, over about 20 or 25%
14 of the route of their oil pipeline is burying the
15 pipeline, as I understand it.

16 A Yes, but I understand
17 that ditching is being done in summer.

18 Q Oh yes, I understand that.

19 A If my information is
20 correct, and the ditching of -- or the construction of
21 a ditch in summer at high temperatures is an entirely
22 different situation than the construction of a ditch
23 in winter when the ground remains frozen and there's
24 no erosion, no thermokarst or thermal destruction or
25 disturbance of the backfill, and I think that readings
26 you might take from a summer ditching operation in
27 Alaska would not be at all indicative of what you
28 might expect from a winter operation in Canada.

29 Q Well, be that as it
30 may, and the considerations you have mentioned are

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1 fundamental, we have begun steps through Dr. Fyles
2 to get whatever information exists in relation to
3 the impact of the Mackenzie Highway and the Dempster
4 Highway. What about the Alyeska's refusal to allow Dr.
5 McCart or anybody else to monitor the impact of
6 pipeline construction on rivers and streams in Alaska?
7 Surely the Federal Government of the United States
8 must be monitoring those activities. They must be
9 -- Dr. McCart's surely isn't the only proposal to
10 monitor what's occurring there. You're saying, "Well,
11 it's not the same thing so we can forget about it."
12 I'm suggesting that it may well be that there is a
13 body of information there now or in the process of
14 being developed that could be examined and then we'd
15 know.

WITNESS HEMSTOCK:

16 A I think there may very
17 well be work by others that will provide some monitoring
18 information, and I'm sure that that would be useful
19 to us, even though it might not directly apply.
20 But I thought the question was are we prepared or
21 was Dr. McCart prepared to go there, and I think that
22 that would be very difficult. But certainly U.S.
23 agencies will be providing that and I'm sure and we
24 would have access to whatever documents are published.

25 MR. RYDER: The only reason I
26 raise it, Mr. Hemstock, is that it strikes me that
27 notwithstanding the different times of the year in
28 which that pipeline is going to be constructed, that
29 it does provide many useful lessons, or can provide
30 many useful lessons for us which could be used in

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1 assisting this Commission in performing its function.
2 There will be summer crossings in Canada, most of
3 them will be in the wintertime but there will be
4 summer crossings in Canada, and the Alyeska provides
5 the best examples in the world of summer crossings.
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1
2 A Well, there have been
3 hundreds of summer crossings in Canada already and
4 thousands of miles of pipeline.

5 Q No, I am talking about in
6 the Arctic and in Arctic conditions and for pipeline
7 purposes.

8 A Well that's-- I think there
9 would be some usefulness there, yes.

10 Q Now, I am not familiar with
11 the various schemes in Canada that we can have access to
12 as you are, but you have mentioned them and I was just
13 wondering in passing if that's one of the things that
14 you intend to be doing in the future, that is monitoring
15 some of these crossings and other similar activities
16 in Canada that Dr. McCart can get at, to help him assess
17 the impact that your going to be facing and we are going
18 to be facing in our pipeline.

19 A Dr. McCart has already
20 mentioned that he has been doing those studies.

21 Q And are we dealing specifically
22 for example, with crossings and monitoring crossings
23 in the wintertime? That kind of problem?

24 WITNESS MCCART: We have made
25 some observations. We went up and looked at the
26 Kotaneelee River for instance during the winter and
27 there is information available on that crossing from
28 other sources as to what happened during the actual
29 crossing of that river; sediment loads and things of
30 that nature. We have been looking in some detail as I

1
2 mentioned earlier at the Inland Gas Pipeline and looking
3 in particular at some fall crossings of three streams
4 there and we have been monitoring this and looking at
5 it over the last eight months to see what in fact
6 happened as far as sedimentation of the bottom and
7 benthic invertebrate populations goes.

8 We have also taken a series
9 of samples which are taken upstream and downstream of
10 pipeline crossings in Alberta. These are pipelines that
11 have been in position for some time just to see if we
12 can detect any significant differences in conditions
13 upstream and downstream of these pipelines. So we are
14 doing this kind of thing.

15 Q And as you do it, I suppose
16 you will come to the time when you are in a position
17 to file reports for us to have a look and learn from
18 what you have studied.

19 A Yes, the Inland Gas-- The
20 analysis of this data is still underway.

21 Q Can we expect reports?

22 A You can expect a report on
23 it at sometime during the first quarter of next year.

24 I would suggest maybe
25 towards the end of the first quarter.

26 Q I am sorry?

27 A More than likely towards the
28 end of the first quarter.

29 Q Yes. Now, is that a winter
30 crossing?

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1
2 A Fall. Autumn. Yes September,
3 October I think.

4 Q Yes, and is that in the
5 Arctic?

6 A Well, southeastern British
7 Columbia is not in the Arctic, no.

8 Q No. Is there any material
9 that you can provide us on this general subject which
10 bares on winter crossings in the Arctic?

11 A No.

12 Q And that drives me back to
13 Alyeska but I think we have thrashed that out sufficiently.
14 I was wondering, Mr. Hemstock, do you really need Alyeska's
15 approval to visit some of their sites? Cannot that be
16 done by or through the various government agencies that
17 are regulating that line?

18 WITNESS HEMSTOCK: Well, it's--
19 I don't think the difficulty is going and looking at it.
20 That can be arranged. The difficulty is getting per-
21 mission / ^{to put} research people in and taking measurements
22 and working in an area and this is where we have not had
23 any success.

24 Q I take it you have run up
25 against an outright refusal have you? Is that what we
26 are talking about?

27 A Yes, I think that was the
28 crux of it, yes.

29 Q All right. Now, Dr. McCart
30 you have spent some time in response to some questions by

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1
2 Mr. Scott last week and to Mr. Bayly, dealing with the
3 criteria you use for determining whether or not some
4 kind of anti-siltation device or some kind of protective
5 measures should be introduced. And I take it that the
6 protective measures that we have at hand already, and
7 I am sure that studies have been conducted on an ongoing
8 basis which will produce others and better ones, but
9 whether they be for the control of explosives or whatever
10 they be, they have to have a cost factor attached to
11 them in a sense that they may involve delay in construction
12 for a period of time while these mitigation measures
13 are brought into a place and for that reason they are
14 not imposed lightly in the field.

15 I mean you don't go up to an
16 engineer and insist on a protective measure unless you
17 are fairly sure that that is required.

18 WITNESS MCCART: Well, I think
19 that's true. You wouldn't ask him to put in a protective
20 measure if you felt it wasn't required, yes.

21 Q Right, and you or any
22 biologist in the field who is responsible for this, will
23 be concerned with his creditability in his dealing with
24 the spread superintendent?

25 A Yes, we want creditable
26 people.

27 Q Right, and you want people,
28 not only who are creditable at large and creditable in
29 the biological community, but people who can maintain
30 their creditability with the engineers throughout the

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1
2 project. I mean in order for that system to work, where
3 you have an engineer on the one hand whose job is to
4 get the pipeline constructed and the biologists on the
5 other whose job is to protect the environment so that
6 that relationship can work, it would be foolish for the
7 biologist to cry wolf too often.

8 MR. MARSHALL: Well, sir there
9 has been fairly extensive evidence that the company has
10 accepted recommendations for mitigative measures as
11 company policy and the engineers will be charged with
12 the responsibility of seeing that those measures are
13 implemented. I think we have tried to make it clear
14 and Mr. Hemstock has, that the engineers aren't going to
15 be on the one hand and the fish biologists on the other.

16 The engineers will equally be
17 charged with carrying out the design and the mitigative
18 measures that are part of the overall plan.

19 Q I am not dealing with that
20 Mr. Marshall.

21 THE COMMISSIONER: Well, what--
22 You see I am sure Dr. McCart would agree, Mr. Marshall
23 would agree, I would agree, you would agree that these
24 biologists should maintain their creditability and not
25 cry wolf too often. Where is this leading?

26 Q Well, I want to lead into
27 the criteria that Dr. McCart will use or the biologists
28 will use when they decide or the biologists decide that
29 some kind of protective measure will be introduced or
30 requires, is required. I just want to stress the point

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1
2 that it is a decision that can't be made lightly.

3 WITNESS McCART: I would hope
4 that most of these decisions could be made prior to
5 the time that the crew was actually in the field and
6 that we could designate those areas where we felt that
7 additional measures might be necessary to reduce
8 sedimentation if that is what we are concerned about.

9 Q All right. And doesn't your
10 decision in that regard depend on some local knowledge
11 of the water body your dealing with?

12 A Yes, it does.

13 Q All right. And what I am
14 getting at is, you have in many areas fairly detailed
15 local knowledge of the particular water body and what
16 is to be affected and where the population is that may
17 be impacted.

18 And in using this knowledge,
19 I want to know, if you can assist me, I want to know
20 the criteria you bring to bear on the subject.

21 A What criteria I would use
22 in determinig whether it was an area that was especially
23 deserving a protection?

24 Q Yes.

25 A The presense of fish.

26 Q All right. Now, does that
27 mean-- You see you may not be the one that has to make
28 this decision or has to make this recommendation. Now,
29 you can't just simply say to your biologist in the field,
30 where you find fish you must introduce some protective

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1
2 measure. There must be some guidelines that these
3 biologists will have to have.

4 A Where you find fish that
5 might be damaged or a population which might be damaged
6 as a result of some activity associated with the crossing
7 or some other facility.

8 Q All right, and you indicated
9 that the numbers of the populations would be important.
10 Can you not be more specific as to the numbers your
11 dealing with?

12 A I don't-- You see the point
13 that I have been trying to make is that I am concerned
14 about populations regardless of their size because
15 populations are what are important to me. You want
16 to maintain genetic diversity, you have got to maintain
17 the variety of populations. That's what counts. I
18 don't care whether it is one hundred fish or whether it
19 is a hundred thousand fish. You want to protect them
20 and you want to assure yourself that no significant,
21 well I don't like to use that word anymore, that if there
22 is any damage to the population, that the proportion
23 of the population, / ^{that} might be eliminated is not large
24 enough to cause any long term change in population size.

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1 Q In order to make that
2 judgment, Dr. McCart, it seems to me you have to have
3 fairly detailed local knowledge, because in order to
4 make a judgment as to what is a significant population
5 you have to know numbers and areas and --

6 MR. MARSHALL: Here we go
7 again.

8 WITNESS McCart: That's
9 absolutely true, that's exactly what we are trying to
10 put together, is detailed knowledge about fish in
11 particular areas. Now we can have general criteria
12 as well, but I think that if you sit 500 miles away
13 and you sit down and make up a list of general criteria
14 you may end up in fact damaging particular populations
15 because they don't quite fit into this system under
16 which you're operating, so we have to have both. You
17 should have some general criteria, my general criteria
18 is that sedimentation should be kept to an absolute
19 minimum, using whatever methods are necessary, wherever
20 there is likely to be a population affected, and that
21 in particular sites we would want to look at the
22 crossing plans, we might want to make some suggestions
23 about the crossing at that point, for special mitigative
24 measures, if we feel that this is an area deserving of
25 special consideration. Now there will be plans circula-
26 ted, as I understand it, for each of these crossings,
27 and we would be in a position to comment on them and
28 indicate if we felt that special measures were required.

29 MR. RYDER: Q Well now, you've
30 got really two general situations. The first is where

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1 you have some detailed knowledge of the water body
2 you're dealing with, so you can tell (a) whether or
3 not protection is required, and (b) you can
4 probably tell the degree of protection that is necessary.

5 That's one area, and I take
6 it when you approach a water body of that kind you're
7 in a position to give the kind of advice that is
8 required. What about the other area, that is where
9 you lack knowledge, with respect to a stream or water
10 body that may be impacted?

11 A Well, I would say this,
12 that if we felt, if it's a stream for which we lack
13 particular knowledge we must assume that there's a fish
14 population there and take appropriate steps to reduce
15 sedimentation to a minimal level.

16 Q So you're driven then
17 in that situation to maybe over-compensate?

18 A Yes you may be, yes.

19 Q And that, I take it,
20 seems to be the way they've done it in Alaska.
21 They've given general rules for prohibition generally
22 against siltation unless -- well, they've just done
23 that, and then it's up to the mile by mile bureaucracy
24 that they have to determine what specific methods
25 are necessary to apply that general rule, in any
26 particular case.

27 A Yes.

28 THE COMMISSIONER: That's what
29 they're doing there and you agree with it?

30 A Well, I'm not quite

1 certain what they're doing there, but I understand
2 that their standards are fairly rigorous. But this
3 is something that I don't have a great deal of detailed
4 knowledge of.

5 MR. RYDER: Q But I wonder
6 if that doesn't create problems of itself, and I'd
7 like you to talk about that. I refer you to an
8 example, say, of a small stream that you can perhaps
9 jump across, and the engineer and his crew come to
10 this stream with their ditching equipment and the
11 biologist says, "Well, I believe there's fish there,
12 we saw four fish the other day."

13 Now, you don't really know
14 the impact of ditching, at crossing that stream because
15 you're not able to do an environmental impact study
16 with respect to every little water body ^{affected} / so if I
17 accept your theory -- and I'm not criticizing it --
18 but if I accept it, does it mean that we have to, or
19 that Mr. Hemstock and his people have to put in some
20 perhaps expensive procedure to avoid hurting that
21 stream?

22 A O.K., I would revise
23 -- you know, there are classes and kinds of streams
24 which are unlikely to have fish populations in them
25 at any time, very small ones, fenereal streams, I
26 wouldn't undertake to put in elaborate procedures
27 to prevent sedimentation in the stream which in fact
28 is unlikely to ever have fish in it, or which doesn't
29 feed into an area. Certainly you can get situations
30 where an enormous amount of money is spent

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1 helicoptering people and equipment over streams that
2 you know have no fish population. If you set a very
3 rigorous general regulation regarding streams.

4 Q So --

5 A What it comes back to
6 again, of course, I really think the best approach is to
7 operate on a site by site basis, having site
8 specific information.

9 Q But I'm wondering whether
10 that's really possible in the foreseeable future. You
11 know that there are 600 water bodies that will be
12 affected by a crossing, and there must be many other
13 activities which as wharves and gravel removal and
14 things of that kind which will impact untold numbers
15 of water bodies, and is it not asking too much of
16 you -- I don't know, it may not be -- to do an impact
17 study of all of them prior to construction?

18 A You can't do an impact
19 study of all of them. You certainly want to use the
20 best procedures available to minimize sedimentation
21 or whatever the effect might be, and certainly while
22 it's true that we can't look at every stream, it's
23 also true that most of the sizeable fish populations
24 have been identified by somebody or other along the
25 course of that pipeline and we can certainly define,
26 I think, most of the areas where very detailed
27 design might be necessary, where you might have to
28 have special factors.

29 Q So see if I can under-
30 stand you in terms of what you mean when we take upon

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1 ourselves the task of drafting terms and conditions,
2 what you're saying is that with respect to some of the
3 important areas that you've located, with respect to
4 all of the important areas that you have located
5 prior to construction, you are in a position to devise
6 fairly specific requirements.

7 A If they're required.
8 Remember, most of the ditching will take place during
9 the winter.

10 Q That's right, but with
11 respect to those areas that you know you can be
12 specific in the terms and conditions which you draft--

13 A Right.

14 Q -- as to whether any
15 requirement is needed or any method is needed to
16 protect the environment, or not, and if so the kinds
17 and the size of it.

18 A We would expect to comment
19 on the construction plan for each of these things.

20 Q All right, so that's in
21 the areas that you do know and you can be specific
22 about that. Now in the areas where you don't know all
23 the facts necessary to make specific proposals then
24 you are either driven back to two further alternatives,
25 one is to be very cautious, in special situations
26 and the other is to -- and I put this out to you for
27 discussion -- the other is to devise rules and general
28 application. that will assist the engineer and the
29 biologist --

30 A Rules of general application

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1 that would apply to certain classes of streams. It
2 would be a matter of classifying streams. We have
3 done this for the North Slope and I think yes, we
4 could say that in streams of this kind we feel that
5 the minimal protection would require such and such a
6 technique. Streams of another class you might require
7 other kinds of techniques. I think that might be
8 a reasonable approach.

9 Q All right.

10 A For those where you don't
11 have site specific information

12 Q And I take it you
13 prefer that approach to the Alyeska approach, which
14 just take it from me to be so is that a general
15 prohibition essentially which applies to all streams
16 and all water bodies in the area.

17 A If that in fact is what
18 the situation is in Alaska, I'm not certain of that
19 but I'll take your word for it.

20 Q Now, I wonder if we
21 can illustrate some of these problems by referring to
22 a specific area, a specific river, and that's the
23 Loon River.

24 THE COMMISSIONER: The Loon
25 River.

26 MR. RYDER: I don't know whether
27 this falls into the area of where we know the facts
28 or whether we know any part of the facts, or whether
29 we know a little about this river. It's mentioned in
30 your stream catalogue at page 135

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1 And if I can read from
2 your assessment in the bottom right-hand corner of
3 your stream catalogue where it states something like --

4 THE COMMISSIONER: Just wait
5 a minute.

6 MR. RYDER: All right. Have
7 you found the page in the stream catalogue, Mr.
8 Commissioner?

9 Just reading from a
10 portion of your assessment, Dr. McCart on the page 135,
11 you state,

12 "It serves as a spawning and nursery area for
13 longnosed sucker, longnosed bass , pike, and
14 grayling. It is a possible spawning area for
15 whitefish species, cisco species and nine
16 spined stickleback and lake trout."

17 Then you go on to say and I quote:

18 "The winter conditions appear suitable for
19 overwintering. The area is sensitive from
20 May to November and precautions should be
21 taken during winter construction."

22 So, just leaving that for the moment, that's what, the
23 portion of what we know about that stream. The
24 alignment sheets of Arctic Gas give us some further
25 information. I am referring to sheet number 1B-0200-
26 1013. And we see that for fish, it shows that the
27 grayling, round whitefish and longnosed sucker and
28 pike have been captured at the crossing site.

29 And again, you say that
30 it may be an overwintering area for some species and

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1 that it is a sensitive from May 1 to November 1 and the
2 only other information that I have been able to find
3 about this river is contained in the Environmental
4 Protection Board's atlas, map number ES-3 indicates
5 that fish spawning in nursery areas are located
6 downstream from the pipeline crossing and some over-
7 wintering area lies upstream so that's what we know.
8 At least, that's what I have been able to locate as to
9 our current knowledge of the Loon River and just so
10 that I can understand more accurately your criteria for
11 intervening in a particular crossing, is this enough
12 information for you to be able to make a decision with
13 respect to any number of things, such as siltation
14 control or water removal limits or controls for
15 explosives and matters of that kind?

16 A Well, if this area were
17 considered for water removal, I would certainly want
18 more information on the discharge and things of that
19 sort. As far as sedimentation goes, this stream does
20 have the potential for overwintering fish. Now, my
21 memory of this area is that there is some open water
22 around the outlet of Loon Lake. I suspect that the
23 majority of the fish would probably overwinter in the
24 lake rather than the river itself.

25 Our observations were
26 made at a time when there was an ice cover. We couldn't
27 get an estimate of the population that might be over-
28 wintering in the river itself in the vicinity of this
29 crossing but I think we would have to presume that
30 there may be overwintering fish and we should take

Banfield, McCart, Hemstock,
Cross-Exam by Ryder

1 adequate precautions. This is a situation where you
2 might want to utilize settling basins to limit the
3 downstream movement of material.

4 Q All right. Firstly
5 in your judgment we know enough about this river to
6 enable you to make some recommendation on siltation
7 problems.

8 A Yes.

9 Q And with respect to
10 water removal you would like to know a little bit more.

11 A Yes. I think so. I
12 have no knowledge of this area is anticipated as a
13 water source but if it were considered we would have
14 to take a look at it, determine what the fish charges
15 were and try and get some more information on the
16 distribution of overwintering fish if any.

17 Q All right, now. Just
18 so that I can understand the workings of your mind
19 in this. Can I ask you about explosives? Do you know
20 enough from the information that we've given you or
21 that you've provided us really, do we know enough
22 to enable you or the engineer to select controls for
23 explosives to know whether any should be implemented?

24 A My understanding is that
25 on this kind of crossing, of course, explosives wouldn't
26 be used. In the case that further investigation revealed
27 that it would be necessary to use explosives at this
28 crossing. I think we would^{want} to go into the area at
29 about the time of freeze-up and find out whether
30 there were any major concentrations of fish that might

Banfield, McCart, Hemstock
Cross-Exam by Ryder

1
2 be affected by the explosives.

3 Q Now, is the problem
4 caused then if the desire or the decision to use
5 explosives occurs after it's too late for you to
6 gain this additional knowledge? What happens then?

7 You see, I'm still
8 trying to discuss the general rules or the guidelines
9 which you would like to see in order to protect your
10 particular interest.

11 A Well, I would think
12 obviously that if something came up at the last minute
13 and we couldn't get any information on it and it were
14 absolutely necessary to use explosives but we were not
15 in the position to know whether in fact there were
16 overwintering fish. It's very difficult to see what
17 we could about the situation.

18 Let me point out that
19 this particular example. This is not the kind of stream
20 where you would expect to find a massive concentration
21 of overwintering fish. You know, it's a relatively
22 small stream and there may be a few small pools
23 scattered and I really doubt that there is any situation
24 where you would find that large proportions of the
25 population inhabiting a single pool that might be affected
26 by explosives in this way.

27 Q It's really an example
28 of the kind of streams where it's hard to know whether
29 you need to interfere and insist on protective devices
30 or whether you're not -- whether you shouldn't interfere.

Banfield, McCart, Hemstock
Cross-Exam by Ryder

It's sort of on the
borderline, I guess.

A Well, it is kind of
on the borderline. As I say, we would hope that in the
crossing plans, which are supposed to be developing for
each of these crossings that we in our comments on it
if it were indicated that explosives were necessary,
we would go in and look and make recommendations. If
there were no major concentrations, we wouldn't worry
about it but if there were we would make suggestions as
to or indicate certainly that this might be the problem.

Q Now, can I just ask
you to look at the guidelines that you have produced in
the various -- to meet the various problems that you
foresee. For example, your guidelines to reduce
sedimentation which is found as you know in your
Biological Report Series, Volume 15. I'm not sure of
the chapter.

A Chapter 4.

Q Yes, and it's on page
24 of that chapter.

A Right.

Q And we're now at the
stage where we're dealing with the problem where we
haven't got, to cover those areas where we haven't got
detailed local knowledge so that we can't be as
specific as you would like to be. So you're driven
to either being over-protective or you're driven
to some rules of general application that will assist the

Banfield, Hemstock, McCart
Cross-Exam by Ryder

1
2 engineer and the biologist or whoever has to make the
3 decision. Assist him in making the decisions that ought
4 to be made.

5 It's my view and I would
6 like ^{you} to discuss it that these guidelines while they are
7 nobody can quarrel with them but they're not much for
8 an engineer or a biologist in the field to hang his
9 hat on. They don't really indicate and I'm -- what
10 he should do in a specific situation, the situation
11 that he may confront himself with.

12 A Well, that's in the
13 nature of guidelines, isn't it? That they're quite
14 general and these are not criteria. These are guidelines.

15 The essence of the
16 whole thing is minimized sedimentation. I might just
17 as well have said that. That would be an even more
18 general guideline and what you're saying is we need
19 more specific --

20 Q No, I'm not saying that.
21 I'm saying that there are situations where you can't
22 be specific and that you're driven then to general
23 guidelines but the general guidelines may not enough.
24 They may have to be supported by some back-up
25 mechanism which requires people to go out there at
26 the time of the construction and take a look and
27 determine --

28 A Two things. Number 1, any
29 stream which is large enough to have a fish population
30 is also probably large enough to have a detail crossing

Hemstock, Banfield, McCart
Cross-Exam by Ryder

design so that we would be in a position to comment on
that particular design.

And the second thing
has slipped my mind. I should have taken a note. It
will come to me.

Q Can I stop you there.

Oh, sorry, if you want
to continue I don't want you to feel that you --

A No, go ahead.

Q Can I stop you there?

Does that cover all 600 crossings that you have in mind?

THE COMMISSIONER: No, just
the ones that would be designed.

Q Yes, and that leaves
you with over 400 crossings where you don't have a
specific design?

A Yes and I was going to
say with some exceptions that is true. The other thing
is that there will be people in the field as the
construction is proceeding. You see, one of the diffi-
culties I suppose is that we have to have people in
the field because there can be changes annual changes
from one year to the next is certainly true. So that
you may come up with a site specific design on the
basis of three winter's observation and you find that
okay in this particular year conditions are
different. Icing is different. There is water in the
area where there hasn't been water in previous years.

And, so we have to have

Hemstock, Banfield, McCart
Cross-Exam by Ryder

1
2 people in the field who go preceding the construction
3 and this was pointed out yesterday. We have to have
4 people there. They would act in liason with
5 government employees from the appropriate regulating
6 body and they would work ahead of the spread so that
7 on their head would have to be some mechanism for
8 providing on-site changes in plans if required.
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Banfield, Hemstock,
McCart,
~~CROSS~~-Exam by Ryder

1 Q And those changes you say
2 or recommend may include the decision to introduce some
3 kind of protection, when before we had thought that
4 protection wasn't needed?

5 A That's quite true, yes.

6 Q So the importance of the
7 particular water body, the rating of that particular
8 water body may be changed right at the last minute?

9 A Could be, yes. That's why
10 you have to have competent people available preceeding
11 the construction so that we don't have to shut the
12 construction down for a period of two weeks while
13 people scratch their heads.

14 Q Can I return and I hesitate
15 to do it. We've been discussing siltation so often, for so
16 long, can I just ask you one or two further questions on
17 siltation. This is a problem that we've all agreed requires
18 some monitoring and as you said, at least you said
19 yesterday, it should be done by a competent biologist
20 and I didn't know there was any other^{kind} but assuming that
21 you have a biologist in the field.

22 THE COMMISSIONER: It is
23 different than the legal profession. Let's carry on.
24 It is getting close to 1:00.

25 MR. RYDER: Q Before we have
26 our November break, can you just tell me what problems--
27 I can see how one monitor siltation in Alaska where you
28 are having summer crossing by and large. But how does
29 one monitor siltation which you can't see because it is
30 under the ice?

Banfield, Hemstock,
McCart.

Cross-Exam by Ryder

1 A You drill a hole and take
2 a water sample.

3 Q So that's what you say when
4 your going to monitor siltation for our project?

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Banfield, Hemstock, McCart.
Cross-Exam by Ryder.

1 A Well,
2 of course, you do have the difficulty that you can't,
3 it is somewhat difficult to determine the aerial extent
4 of materials which may have silted out or sedimented
5 on the bottom. Yes, that is a difficulty all right.

6 Q So that really requires
7 a regular program for monitoring rather than the more
8 haphazard method that you could use in the summertime
9 when you just stop at a particular stream, you look at
10 it, you can see the siltation right away and whether
11 there is siltation problem and then leave.

12 Whereas in the wintertime, you
13 have to have a regular problem, or regular process rather,
14 of taking the samples on a regular basis.

15 A I don't quite follow what
16 your trying to--

17 Q It is probably not worth
18 the time I am giving it.

19 A It is more difficult to
20 make observations in the winter.

21 Q The monitoring program has
22 to be done on a regular basis?

23 A Yes, if you are interested
24 in monitoring the downstream-- If you ^{are} in fact going to
25 sit down and your going to measure the suspended sediment
26 loads downstream of every crossing, it is going to be
27 quite a difficult thing to do. But I don't see any
28 necessity to do this.

29 Q Well, you do it, I take it,
30 in order to determine whether there is a problem occuring?

Banfield, Hemstock, McCart.
Cross-Exam by Ryder.

1
2 A No, I don't. You see, you
3 determine whether there is a problem by looking for
4 fish populations and their eggs and whether there is
5 any instability in the area which might lead to long-
6 term sedimentation.

7 I am not concerned about short-
8 term sedimentation occurring in non-critical areas of
9 streams. And I don't see any point in taking water
10 samples in every stream that is crossed.

11 Q Well, assuming you have got
12 an important area and you put in an anti-siltation device
13 at this area, you want to know whether it is working.

14 A In an important area you
15 might want to take those observations. But I don't see
16 that as something that you would want to do at every
17 crossing.

18 Q No. But you want to do it
19 where you expect a problem or where a problem may arise.

20 A You may want to take some
21 regular samples to assure yourself that your methods
22 are in fact working.

23 Q Now, I think as I recall your
24 testimony, you indicated that long-term siltation, that
25 is siltation causes which aren't cleared up with the
26 spring break-up, that those situations cause you more
27 concern than short-term siltation, of course, which is
28 cleared up with the spring break-up, spring flow.

29 I wonder if we could just touch
30 on some of the problems caused by long-term siltation,

Banfield, Hemstock, McCart.
Cross-Exam by Ryder.

1
2 whether or not you anticipate any, can we just discuss
3 at the beginning some of the problems that long-term
4 siltation cause which short-term doesn't? So apart
5 from say the fact that siltation may effect the eggs
6 that are layed in a bed of a stream, if you have it for
7 over a period of years, does it not cause turbidity
8 in the water which will in turn prevent the sunlight
9 from getting at the weeds or the various things that
10 grow in the lakes?

11 A Certainly. This is something
12 that we covered in the discussion of this Chapter 4 of
13 Volume 15. We have gone through, everybody goes through
14 the same list of things. It might reduce productivity
15 by shutting off sunlight and reducing algae productivity
16 and it might cause a reduction in benthic invertebrate
17 populations and it might do this and it might do that.

18 There are a large list of
19 things that long-term sedimentation might cause, but
20 one of the other things that came out in our study is
21 that when we looked at what was long-term siltation
22 of a relatively massive sort from a seismic line that
23 we were unable to detect any significant difference in
24 the statistical sense in the populations if you were
25 more than 400 to 800 meters away from that source of
26 sedimentation.

27 . The materials-- What bothers
28 me is not so much turbidity, unless it occurs in a
29 lake, what bothers me is the materials that settle out
30 on the bottom and most of the materials that are going

Banfield, Hemstock, McCart.
Cross-Exam by Ryder.

1
2 to settle out on the bottom, will actually settle out
3 within a very short period of time.

4 Q So, that is one of your---

5 A Oh, sorry. A very short
6 stretch of stream.

7 Q All right and you mentioned,
8 I think, 800 feet?

9 A Well, 800 meters.

10 Q 800 meters. All right. Now,
11 has that been one of your criteria that if you have an
12 important spawning area which is downstream further
13 than that, then you might consider that it is not going
14 to be impacted by any kinds of siltation that you expect
15 from a crossing more than 800 meters away?

16 A Well, 800 meters-- I would
17 think that you might be able to and a hydrologist might
18 be able to calculate these things, knowing something
19 about the sub-strates in streams and knowing something
20 about the winter flows, he might be able to calculate
21 the point at which, beyond which you would not expect
22 to have any significant deposition of materials on the
23 bottom, as a result of the winter crossings. And that
24 you may for major crossings or areas where you are
25 very much concerned about, a critical area or an area
26 of great importance to fish, you may be able to calculate.
27 And it is possible in some instances if your too close
28 to an area like this, to move the pipeline a short
29 distance.

30 Q I understood that one of the

Banfield, Hemstock, McCart.
Cross-Exam by Ryder.

1
2 lessons from Alaska was that siltation can be experienced
3 from many miles downstream, up to 8 miles. Have I
4 misread someones opinion?

5 A No, you can certainly detect
6 turbidity in the water and I, what I am saying is that
7 the heavier materials that are going to cause serious
8 sedimentation of the bottom, if they are going to settle
9 out, are going to settle out in a relatively short
10 distance.

11 Now you can still detect
12 turbidity in the water somewhat downstream but that is
13 very often caused by very fine materials that are going
14 to settle out only very slowly.

15 Q All right. Now, dealing
16 with long-term siltation problems. You recognize
17 that that can be a problem and you have dealt with it
18 extensively in your reports and can you talk about how
19 you foresee that problem arising in our context,
20 when you have the initial activity of this pipeline
21 with the blasting and the ditching and then you may
22 have repairs to the line and then you may have looping
23 and then you may have-- and some further activities
24 nearby of a different type, highway construction or
25 maybe even^{an}/oil line; now isn't that the kind of thing
26 which will have some impact in this area, that is long-
27 term siltation?

28 A This is the sort of situation
29 I think we want to discuss in the-- Isn't there supposed
30 to be a section on the effects of other facilities

Banfield, Hemstock, McCart.
Cross-Exam by Ryder.

1
2 and things like that. Certainly this kind of thing
3 might result in siltation which occurs over a longer
4 period of time but from the initial laying of the
5 pipeline, one would not expect that at most crossings,
6 that you would have any large amounts of material moving
7 continuously down most streams.

8 Q All right. Now, what
9 bearing do these considerations have on your decisions
10 to introduce some kind of anti-siltation device or
11 any other kind of device? In other words, you reach
12 a decision as to an appropriate level of protection
13 for a gasline. Now, surely then, you tell me if I am
14 wrong, that your decision may be varied if you stop
15 considering the gasline in isolation but consider it
16 in the context of a series of other developments which
17 may be taken.

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Banfield, Hemstock, McCart
Cross-Exam by Ryder

1 A No, my notion is that
2 we should minimize siltation from the gas pipeline.
3 We want to minimize the level of siltation that results
4 from the gas pipeline, and that's what we're after.

5 Q Right, and I agree with
6 that, but I'm saying that the level of your protection
7 which is necessary to minimize siltation from a gas
8 line and the decision you decide upon to do that, will
9 that be altered if you did consider the gas line in
10 the larger context, which is one of a series of develop-
11 ments which may affect the area? In other words,
12 you have a decision which is adequate for a gas line.
13 Will it be adequate for other -- for a gas line in the
14 larger context?

15 A Well, I don't quite
16 follow this. Over most of the length of the pipeline
17 the other facilities are going to follow the gas line.
18 We don't know when, we don't know how, we don't know
19 if, and if we knew that there would be an oil pipeline
20 following the gas pipeline two years after or something
21 of that nature, you want to know whether the recommenda-
22 tions I would make would be different for a gas pipeline?
23 My answer would be "No."

24 Q And why is that?

25 A That's because I think
26 that my major concern is with a gas pipeline and I have
27 to ensure the survival of fish populations and that
28 if there is a critical area there I want absolute
29 minimal sedimentation, I would recommend that settling
30

Banfield, Hemstock, McCart
Cross-Exam by Ryder

1 basins be placed, or what other facilities would in
2 fact result in minimal sedimentation in the vicinity
3 of that critical area, irrespective of the fact that
4 it might be followed by an oil pipeline later on.

5 Q Would it not, the
6 prospect of these other developments, would it not
7 make you more cautious in this instance?

8 A I think I want to be
9 cautious in the first instance, that's what I'm saying.

10 Q So with respect to fish,
11 in any event, your standard of protection is the same
12 whether or not you have a gas line, only that you're
13 concerned about, you'd have the same standard if you
14 were considering a gas line in a transportation
15 corridor with other developments.

16 A Yes, I would.

17 Q So that the terms and
18 conditions that you would propose for a gas pipeline
19 only would be the same terms and conditions that
20 you propose for a gas line in a transportation corridor.

21 A Yes, I think so.

22 THE COMMISSIONER: Well, Mr.
23 Ryder, I think that this would be an appropriate time
24 to adjourn. I indicated yesterday that we wouldn't be
25 sitting this afternoon so I think we ought to adjourn
26 until a week Monday at 1 P.M. We've been at this now
27 for three weeks. These gentlemen have only been with
28 us for a week, but -- well, no, Mr. Hemstock and Dr.
29 McCart have been with us longer than that -- but we
30 will adjourn now till a week Monday at one o'clock

Banfield, Hemstock, McCart
Cross-Exam by Ryder

1 in the afternoon.

2 MR. MARSHALL: Sir, I'd like
3 to raise one matter, if I may. I heard someone
4 mention there was a possibility of changing the
5 schedule in the New Year. If that's the case, I'd
6 like to be informed about it because I understand
7 P.W.A. are revising their schedule of their flights
8 to Inuvik, and they're cancelling some of the flights,
9 and there's real difficulty with accommodation and
10 transportation and so on, and I'd kind of like to know
11 about any of these changes so that we could make some
12 plans.

13 THE COMMISSIONER: Well, there
14 has been no change so far. That is we would begin in
15 Inuvik on Tuesday, the 13th of January, for two weeks,
16 and then again on Tuesday, the something or other of
17 February, through three weeks -- the what -- the 3rd
18 of February, and the hearings in the communities,
19 Tuktoyaktuk, Holman Island, Sachs and Paulatuk
20 would be the first two weeks in March. That's a change,
21 Mr. Marshall. You're not that drastically affected,
22 but do you know what the actual dates are, Mr. Bayly?

23 MR. BAYLY: It is the first
24 two weeks in March, I believe the 1st to the 5th is
25 the first --

26 THE COMMISSIONER: The only
27 change -- now I don't know, I heard that announcement
28 on the radio about the P.W.A. schedules and I think
29 we'll have to leave it to Miss Hutchinson to work that
30 out. Those were flights directly from Edmonton to

Banfield, Hemstock, McCart
Cross-Exam by Ryder

1 Inuvik, as I recall. The only change we might make,
2 and we would advise you next week, would simply be
3 to put -- to spend that week of the 13th in Yellowknife
4 and go up to Inuvik the following week and just set
5 everything back by a week, except the community
6 hearings, the first two weeks in March. I'm sorry, I
7 can't be more specific but I think that's where it
8 sits. But there's no major changes contemplated and
9 we're all in the same dilemma about the P.W.A. flights.
10 If that change is made, that is that we have the week
11 of the 13th in Yellowknife to finish this phase, and
12 then go up to Inuvik the following week, we would
13 still have two weeks there, a week off, two more
14 weeks in Inuvik and that would probably mean a week
15 off, and then the first two weeks of March in the
16 communities.

17 But we'll try to work that
18 out next week, Mr. Marshall.

19 MR. MARSHALL: Thanks.

20 THE COMMISSIONER: Miss Hutchin-
21 son will let you know. All right, thank you.

22 (PROCEEDINGS ADJOURNED TO DECEMBER 1, 1975)
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M835
Vol. 92

Mackenzie Valley pipeline inquiry:

TITLE
Vol. 92 21 November 1975

<small>DATE DUE</small>	<small>BORROWER'S NAME</small>

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M835
Vol 92

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Government
Publications

MACKENZIE VALLEY PIPELINE INQUIRY

IN THE MATTER OF APPLICATIONS BY EACH OF
(a) CANADIAN ARCTIC GAS PIPELINE LIMITED FOR A
RIGHT-OF-WAY THAT MIGHT BE GRANTED ACROSS
CROWN LANDS WITHIN THE YUKON TERRITORY AND
THE NORTHWEST TERRITORIES, and
(b) FOOTHILLS PIPE LINES LTD. FOR A RIGHT-OF-WAY
THAT MIGHT BE GRANTED ACROSS CROWN LANDS
WITHIN THE NORTHWEST TERRITORIES, ~~OFFERED FOR SALE~~
FOR THE PURPOSE OF A PROPOSED MACKENZIE VALLEY PIPELINE

AND

IN THE MATTER OF THE SOCIAL, ENVIRONMENTAL AND
ECONOMIC IMPACT REGIONALLY OF THE CONSTRUCTION,
OPERATION AND SUBSEQUENT ABANDONMENT OF THE ABOVE
PROPOSED PIPELINE

(Before the Honourable Mr. Justice Berger, Commissioner)

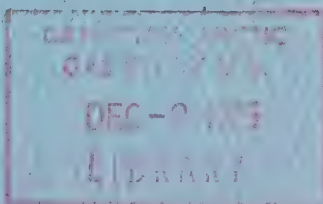
Yellowknife, N.W.T.

December 1, 1975.

PROCEEDINGS AT INQUIRY

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APPEARANCES:

Mr. Ian G. Scott, Q.C.,
Mr. Stephen T. Goudge,
Mr. Alick Ryder and
Mr. Ian Roland for Mackenzie Valley Pipeline
Inquiry;

Mr. Pierre Genest, Q.C.,
Mr. Jack Marshall, and
Mr. Darryl Carter for Canadian Arctic Gas
Pipeline Limited;
Mr. Reginald Gibbs, Q.C.,
Mr. Alan Hollingworth &
Mr. John W. Lutes, for Foothills Pipe Lines Ltd.;

Mr. Russell Anthony &
Pro. Alastair Lucas for Canadian Arctic Resources
Committee;

Mr. Glen W. Bell and
Mr. Gerry Sutton, for Northwest Territories
Indian Brotherhood, and
Metis Association of the
Northwest Territories;

Mr. John Bayly
or
Miss Leslie Lane for Inuit Tapirisat of Canada,
and The Committee for
Original Peoples Entitle-
ment;

Mr. Ron Veale and
Mr. Allen Lueck for The Council for the Yukon
Indians;

Mr. Carson H. Templeton, for Environment Protection
Board;

Mr. David Reesor for Northwest Territories
Association of Municipal-
ities;

Mr. Murray Sigler for Northwest Territories
Chamber of Commerce.

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Yellowknife, N.W.T.

December 1, 1975.

(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

THE COMMISSIONER: Well, ladies and gentlemen, we will come to order.

MR. MARSHALL: Mr. Commissioner, perhaps before my friend continues his cross-examination I ought to file as exhibits two documents that were handed out last week. I didn't have sufficient copies to enter them. The first would be the report of L.G.L. Limited entitled:

"A summary of Ornithological Recommendations in regard to the proposed gas pipeline route."

I understand that will be Exhibit 351.

(REPORT "A SUMMARY OF ORNITHOLOGICAL RECOMMENDATIONS IN REGARD TO THE PROPOSED GAS PIPELINE ROUTE" MARKED EXHIBIT 351)

MR. MARSHALL: The second is a report of Aquatic Environments Limited entitled:

"Review of the Literature concerning domestic fisheries associated with proposed gas pipeline routes in the Mackenzie River Valley."

That would be 352.

(REPORT "REVIEW OF THE LITERATURE CONCERNING DOMESTIC FISHERIES ASSOCIATED WITH PROPOSED GAS PIPELINE ROUTES IN MACKENZIE VALLEY" MARKED EXHIBIT 352)

M R. MARSHALL: I also have prepared a list of additional reports and I would like to enter a copy of the list as Exhibit 353, and

Banfield, Gunn, Hemstock
McCart, Jakimchuk
In Chief

1 I'll distribute copies. I'm just waiting for them to
2 be brought in from the photocopying room and I'll hand
3 them out as soon as they are available, sir.

4 (LIST OF ADDITIONAL REPORTS MARKED EXHIBIT 353)

5 MR. MARSHALL: Also, sir, you
6 had asked Mr. Hemstock about work that he had done and
7 a report on the Canol project, and Mr. Hemstock has
8 brought some material with him, sir, that you expressed
9 an interest in. Perhaps he could speak to that right
10 now, if you wish and describe the materials that --

11 THE COMMISSIONER: Fine.

12 MR. MARSHALL: -- the report
13 that he did. He has another book as well.

14 THE COMMISSIONER: Excellent.

15 ALEXANDER WILLIAM FRANCIS
16 BANFIELD,
17 WILLIAM W.H. GUNN
18 RUSSELL ALEXANDER HEMSTOCK,
19 PETER J. McCART,
20 RONALD DANIEL JAKIMCHUK, resumed:

21 WITNESS HEMSTOCK: Sir, you
22 asked about reports that I might have on the Canol
23 operation. This report I prepared in 1944 and '45, and
24 in reviewing it I find that it deals almost entirely
25 with the operation of the line. I drove back and
26 forth between Norman Wells and Whitehorse during the
27 line's operations, so this report details that.

28 The other report I have here
29 is a history of the Canol project and this one deals
30 with the construction right from the concept on. You
may well have seen it. It is edited by Mr. Dick Finney,
and with regard to your question about construction I

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1
2 note that on page 145 they note that some of the weld-
3 ing of the pipeline was done with temperatures down to
4 minus 40 and 50 degrees. So that there was obviously
5 some winter construction of the line.

6 These are only -- this is the
7 only copy, I believe, of this in existence, and this
8 is now quite a rare book so that they are available if
9 you would like to have a look at them.

10 THE COMMISSIONER: Yes.

11 I have seen the book by Mr. Finney, I have read it. I
12 think I had Commissioner Hodgson's copy, if I recollect
13 correctly. The other material on maintenance, perhaps
14 you might just let Miss Hutchinson have both of those.
15 They won't be marked as exhibits, but perhaps I could
16 look at them again and anyone else could who wishes to,
17 and then we could give them back to you so they're not
18 sent to Ottawa with all these other exhibits never
19 to be returned again.

20 WITNESS HEMSTOCK: All right,
21 thank you.

22 THE COMMISSIONER: What were
23 you doing on the Canol line, were you working on it,
24 Mr. Hemstock?

25 A I was -- I went north
26 first with Imperial Oil as a field geologist and then
27 changed over to engineering, and the assignment I had
28 in the latter part of my time there was to study the
29 operation of the Canol Pipeline to see if it might
30 someday be a valid viable pipeline on a commercial

Banfield, Gunn, Hemstock
McCart, Jakimchuk
Cross-Exam by Ryder

1 basis, and then I remained after the Canol project
2 at Norman Wells with the operation of the refinery
3 there.

4 Q Did you reach any con-
5 clusions as to whether the pipeline, the Canol Pipeline
6 might be a commercial proposition after the war?

7 A Not that it could be a
8 commercial operation with the size of line. It was only
9 a 4-inch line, and it simply was not large enough to
10 be an economical venture. On the other hand, the re-
11 serves at Norman Wells were not large enough to support
12 a larger line, so that it just didn't work out.

13 THE COMMISSIONER: Well, I
14 think we're over to you then, Mr. Ryder.

15 MR. RYDER: Thank you, Mr.
16 Commissioner.

17
18 CROSS-EXAMINATION BY MR. RYDER (CONTINUED):

19 Q Can I start now with
20 you, Mr. McCart, with the subject of barriers to fish
21 passage and the particular barrier I have in mind is
22 that of permanent roads. On page 23 of your evidence
23 in chief you refer to the use of culverts to deal with
24 that particular problem. Do you have that in front
25 of you?

26 WITNESS MCCART: Yes, I do.

27 Q Now you say:
28 "Only five culverts will be required for stream
29 crossings."
30

1 Is that five culverts
2 throughout the length of the pipeline, or five culverts
3 of a particular size and over?

4 A That was five culverts, I
5 think, as I understood it in Canada, all of them
6 south of Travaillant Lake, as it says here.

7 Q All right. Now, the next
8 barrier is that of snow roads, during the course of their
9 use. Is that sometimes the cause of a problem with
10 fish passage?

11 A Yes, I think in one of
12 our reports, in volume 15, we show some examples of not
13 snow roads, but winter roads where problems have been
14 caused because debris and other materials were pushed
15 out, including logs, and were not removed.
16 Now, as I understand, snow road construction for this
17 particular project, I don't think that it will present
18 the same kind of problem. I would probably recommend
19 that the snow be removed, or any pad on the ice would
20 be removed prior to abandonment before the spring
21 flood comes, to prevent scouring and that kind of thing
22 in unusual areas as water attempts to go under or over
23 the road.

24 Q So that is the removal
25 of the bridge prior to the spring break up?

26 A Yes.

27 Q Is what you are referring
28 to?

29 A Yes.

30 Q And that is the recommend-

1 ation that you give to Dr. Hemstock and to Arctic
2 Gas?

3 A Yes.

4 Q Now, is there a problem
5 of snow bridges settling into the stream as a result
6 of constant use by heavy construction equipment?

7 A I suppose it could be a
8 problem .. I am not familiar, with most of the winter
9 bridges that we have examined have not in fact been
10 snow roads. As I have said, they have incorporated a
11 large proportion of other materials. It is possible,
12 I suppose, I couldn't really say.

13 Q I take it the removal
14 of these bridges prior to spring break up ^{will} have to be
15 closely timed so as to avoid a siltation problem at a
16 period of low flow?

17 A Yes, I would think that
18 you would have to remove them before any real movement
19 of water began in the spring.

20 Q So it is a question of
21 close watching and removal at the right time?

22 A Yes.

23 Q And you would recommend
24 against removing these bridges in a period of low
25 flow some weeks before the break up?

26 A Well, certainly before
27 break up, before you get any significant movement of
28 water. Now, you do sometimes get, oh, short term
29 thaws, let's say sometime in March before, considerably
30 before you might expect the spring freshet to start and

1 for real continuous thaw to begin. It may not be
2 necessary to pull them out during these short term
3 thaw events, if I can use that phrase, but certainly
4 before any major movement of water began.

5 Q All right. Now, can I
6 turn you to your evidence with respect to methanol, and
7 the Applicant's proposal to discharge the methanol
8 testing solution onto a large water body such as
9 the Mackenzie at about 1% concentration. Now, in your
10 evidence last time, in your cross-examination, you
11 proposed avoiding discharging this solution into areas
12 where spawning would be taking place downstream, where
13 over-wintering eggs were laid downstream?

14 A Yes, our experiments
15 indicate that spawning, or developing eggs are more
16 sensitive than free living fish to the effects of
17 methanol.

18 Q Yes, and I take it, when
19 you refer to your experiments, you are referring to
20 the table on page 23 of your report in the Biological
21 Report Series, Volume 15, I think Chapter 4.

22 Sorry, it is chapter 5, on
23 the experiments by McMann and Caetier.

24 A Yes.

25 Q And am I reading the
26 table correctly when I say that effects on eggs were
27 shown down to .001%?

28 A I doubt that some of these
29 are significant, actually. Whether you could demonstrate
30 that 95.7% hatching at .1 is significantly different

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1 from the control.

2 Q Well, it seems to me that
3 the effect on the eggs from the table that I am looking
4 at is about the same whether the concentration be
5 .001 or .01. The two concentrations seem to have the
6 same effect on eggs.

7 A If you look at the
8 percentage figures, yes, that is what it shows, right,
9 but as I say, I am not certain that some of these are
10 in fact significant differences in a statistical
11 sense.

12 Q Well, in view of the
13 findings of the table as they are outlined for us,
14 are you satisfied that the company's proposal to
15 discharge large concentrations or large volumes of
16 1% methanol concentrations onto the ice of the Macken-
17 zie is a satisfactory one?
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1 A Well, first of all, it's
2 not the company's proposal. It is the company's proposal
3 to deposit 1% methanol on the surface of the ice, not
4 to discharge this directly into the water. Now, one
5 presumes this is going to be a considerable dilution of
6 this material before it actually enters the water and is
7 able to flow. What this dilution would be, I am not
8 certain. I would probably favor a situation where you
9 actually meter the methanol out into the flow in the
10 Mackenzie so you knew exactly what the dilution was,
11 rather than depend on some kind of uncontrollable event
12 like the thaw and the rate at which it is released into
13 the Mackenzie from materials incorporated into ice and
14 so forth on the surface of the Mackenzie.

15 Q All right. Isn't one
16 of the problems with the company's proposal that we
17 don't know too much about the spawning areas in the
18 Mackenzie? We know it's an important river for spawning
19 but we don't know where these important areas are?

20 A One of the things, I
21 think, is it appears that probably most of the spawning
22 takes place in tributaries of the Mackenzie, at least
23 when we get south of the delta, in tributaries rather
24 than in the Mackenzie itself. It's true that we can't
25 really pinpoint important spawning areas in the Mackenzie.
26 This may be in part because there aren't any.

27 Q Well, I'm just referring
28 to the report by J.N. Stein & C.S. Jessop in April,
29 1973, for the environmental social --

30 A What's the title of that?

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Q

"An Evaluation of the Fish Resources of the
Mackenzie River Valley as related to Pipeline
Development, Volume I."

A I don't have that
particular one with me. Possibly you could read me
what they had to say.

Q Well, for example, on
page 80, in paragraph 8.5.7 the authors are referring to
the spawning habits in the Mackenzie of the Arctic
cisco and state:

"No spawning areas were located. Suspected
spawning areas were tributaries of Arctic Red,
Peel, Malcolm, and the Great Bear Rivers."
Perhaps that's not a good one to read you.

A That is in fact saying
that as far as we know they are probably in the tributa-
ries rather than in the Mackenzie itself.

Q Well, what is the present
state of knowledge then about spawning along the Macke-
nzie, in the Mackenzie River itself?

A Well, the state of know-
ledge is this, that a considerable amount of effort has
been expended by the Fisheries Service under Mr. Stein's
direction. To my knowledge they have not shown that
the species that are important either as sports species
or as domestic species, or species that enter domestic
fisheries, they haven't shown that these in fact do
spawn in the Mackenzie itself.

Q It's a question of not

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knowing but suspecting that there may be some spawning areas there.

A It is possible, yes.
Certainly.

Q Isn't there a difficulty in the Mackenzie because of its turbidity? Isn't there a difficulty in locating spawning areas?

A Very definitely, yes.

Q Now, you mentioned -- and I just say this in passing the last time -- that when you take an experiment in a laboratory and apply it to field conditions, the result in the lab will probably be more onerous, if I can use that word, than the result in the field.

A Yes.

Q Isn't the reverse true?

My advice is that --

MR. MARSHALL: He can't do it both ways. He can agree that it is, or he can agree that it isn't, but he can't agree with both.

MR. RYDER: Well, I understand, Dr. McCart, and you tell me if I'm wrong, when you come to apply lab results to the field you usually add a measure of margin of safety in order to account for the adjustment from the lab to the field.

A I don't. It depends on what kind of an experiment you're carrying out, but I think in general you'll find that animals kept, grayling and Arctic char kept in the laboratory for a period of

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2 time are living under rather unnatural circumstances,
3 they're subject to stress. If you put them in the
4 methanol bath they are not in a position to move out
5 of there. Now they have extremely sensitive olfactory
6 apparatus. They know that the methanol is there and
7 in a natural situation they can move out of the area
8 if it so pleases them, whereas in a laboratory they
9 must remain there for a period of anywhere up to two
10 months, in our experiments.

11 Q Are you familiar with a
12 report by J.B. Sprague in 1970 entitled:

13 "Measurement of Pollutant Toxicity to Fish."

14 A No, I don't think so.

15 Q Seeing as how I haven't
16 got it with me, I'll have to leave it. Perhaps if I
17 can locate it before you finish I can take it up again.

18 Now, if I can turn to the
19 subject of leaks which may occur during the testing of
20 methanol, during the use of methanol in your testing
21 operations, and I take it the applicant recognizes
22 the possibility of leaks and the possible impacts that
23 will occur, and I want to ask Dr. McCart or Dr. Hemstock
24 what proposals for containment and cleanup of methanol
25 that escapes during a test can be effective in a situation?

26 WITNESS HEMSTOCK: Certainly
27 we recognize that the possibility of damage due to
28 methanol is more likely to occur as a result of a
29 spill during the testing process than in any other part
30 of the handling of methanol or getting rid of it after

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2 the test is complete. It's also pretty obvious and
3 important too that the stream crossings are the low
4 points in the pipeline, and that is the drainage point
5 to which the methanol will flow if there is a break at
6 the bottom.

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1 Experience generally in
2 testing is that the leakages or the failures are
3 relatively small breaks and the flow is a small flow
4 that can be controlled. There are obvious exceptions
5 to this, but that is the normal in a testing proce-
6 dure.

7 If a break occurs, the procedure
8 that we would recommend would be an entrapment of the
9 spill, using such things as diking materials, sandbags
10 or that sort of thing, rather than any kind of earth
11 moving to make a dam or a retaining structure, because
12 we feel that that would probably cause more damage
13 than the methanol itself.

14 So the approach then would be
15 to dam off the spill as quickly as possible, and then
16 to install pumps and dispose of the test material as
17 we suggested: either by burning or by distillation,
18 and clean up that way.

19 Q Right. I take it that
20 that method that you have described applies to leaks
21 on the valley side, but wouldn't apply to leaks that
22 occur in the water itself?

23 A Not in the water itself,
24 no.

25 Q Is there any measure
26 or technique that can be used for containment of leaks
27 that occur in the water?

28 A Not that I am aware of that
29 would be very practical. The larger streams, of course,
30 I suppose there would perhaps be little concern there

1 because of the dilution due to a break and the larger
2 crossings could be pretested, but a normal stream
3 crossing of a relatively small break, I am not aware of
4 any method that we would have that would prevent a
5 leakage into that streambed.

6 Q Dr. McCart, can I ask you
7 if there was one particular time of year in which
8 you would prefer the methanol testing to take place as
9 opposed to any other time of year?

10 WITNESS MCCART: Well, I think
11 that the methanol testing has to be done during the course
12 of the winter. As a length of pipe is finished it would
13 be tested and I might prefer to have it done during the
14 middle of summer, but I don't think that this is a
15 very practical suggestion, because of course in order
16 to this you are going to have to disturb the tundra and
17 etc., etc., and cause more environmental damage than
18 simply by doing it during winter, in total.

19 Q And I ask you now, Dr.
20 McCart, to turn to the use of explosives in the con-
21 struction. What are the problems that the use of
22 explosives can cause to your -- to fish?

23 A What problems?

24 Q Yes.

25 A Mainly it has to do with
26 shock wave affecting the -- disrupting the swim bladder
27 causing the hemorrhage of blood vessels associated with
28 the swim bladder and the fish die for this reason.

29 Q I see, and I take it
30 that that is more severe when the blasting occurs under

1 ice than it does when there is no ice?

2^S A Well, Dr. Wilimovsky's
3 testimony indicates that, and I would assume that he is
4 correct in that, yes.

5 Q And what do you recommend
6 to curb the harm caused to fish by blasting?

7 A Well, I would prefer to
8 see, because of the problem with ice blasting, if it
9 has to be done during the summer, or open water period
10 at least. You would, if you have sufficient information
11 you would like to see it done at a time when it is
12 unlikely that fish will be massing, congregating or
13 moving by an area in any large number. We would like
14 to see the charges buried, and any case, with the con-
15 struction techniques that are anticipated for crossings
16 where blastings will be required. They will
17 be buried in any case. Other studies have shown that
18 where charges are buried, the danger to fish is very
19 much reduced.

20 Arctic Gas's response to the
21 Pipeline Assessment Committee question number 45 would
22 indicate that these charges will be buried at a depth
23 of approximately 10 feet in most instances.

24 Q Are there any steps that
25 can be taken to frighten the fish away from the area?
26 Or to remove them from the area?

27 A Well, it depends on the
28 size of the stream. In some very large streams it might
29 be rather difficult to do that kind of thing. In a
30 small stream, if it is sufficiently small, let's say

1 we're a spring stream or something of that sort, it
2 would be no problem, I think, to simply seine the
3 fish out of the immediate vicinity of the area in
4 which blasting might be required and simply confine
5 them with a fence or a seine or something like this
6 so that they were out of the immediate area of the
7 blast. Let's say something beyond fifty to a hundred
8 meters.

9 Q But underneath that
10 that is a technique that you have seen and applied?

11 A Seining?

12 Q Yes.

13 A Oh, yes, we can easily
14 do that, as I say, only on small streams, however.
15 On large streams you have got a much greater problem.

16 Q In the winter time, I take
17 it, there is really very little scope for protection?

18 A Yes, I have been looking
19 through the construction schedules and it looks as if
20 probably the only major stream where there will be a
21 large amount of blasting, is the Great Bear River, and
22 the schedule there calls for ditching during July,
23 August and September during a period of open water.

24 Q Now, you have mentioned
25 a couple of times in your evidence that fish populations
26 in the Arctic are resilient and you have been asked
27 some questions on that.

28 Can I just ask you if you have
29 any -- I take it that that is a point which has some
30 controversy attached to it, the resilience of northern
fish species?

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McCart, Jakimchuk
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2 A Well, I think Dr. Banfield
3 might want to discuss this particular thing, talking
4 about the plasticity of Arctic species in general. I
5 think that my point would be as far as fish species
6 goes, that they are adapted to short-term changes, that
7 they can adapt or react in a way to cancel out any
8 detrimental effects of short-term changes in the environ-
9 ment as long as these aren't catastrophic in nature.
10 So that they are plastic, they are adapted to a rather
11 changeable environment.

12 Q Can you refer us to any
13 studies which indicate this?

14 A Well, I'd like to turn
15 this over to Dr. Banfield, who would, I think, just
16 consider this question in general terms.

17 Q You didn't expect to be
18 heard from so soon, Dr. Banfield.

19 WITNESS BANFIELD: Well, I'll
20 reply directly to the question. A good reference for
21 you would be Dunbar, M.J., 1973,

22 "Stability and Fragility in Arctic Ecosystems,"
23 and that's published in the "Journal Arctic", Volume
24 26, pages 179 to 185.

25 Dr . Dunbar is a marine
26 biologist and he treats this subject from the marine
27 ecosystem approach.

28 THE COMMISSIONER: Having been
29 given the reference, are you in a position to summarize
30 what Dr. Dunbar has suggested there?

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A It's very difficult to summarize succinctly. I think this will probably - I'm taking my lead from Mr. Ryder's question to me -- I think I will probably be questioned at length on this. I thought I was trying to answer a question.

MR. RYDER: Can I go back then to you, Dr. McCart?

Q I understood that fish generally had slower growth rates in the Arctic than do their southern counterparts.

WITNESS MCCART: Yes.

Q And doesn't this make them less resilient?

A Well, in fact it may be that quite the opposite is true, because they have slower growth rates, they also have very much longer lives and you don't have a situation where you have a single year class on which an entire population is dependent for the production of genesis, eggs and sperms and things of this sort, so that you may have in the case of a, let's say, lake resident Arctic char or a lake resident lake trout, maybe 15 or 20, fish from 15 to 20 year classes all contributing at any particular spawning, and for this reason, if a single year class is lost, it may have some effect on the population but this is not necessarily going to be a long-term one because of the fact that there is this very considerable overlap in year-classes.

Q I see. What about the

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2 specific life histories that Arctic fish seem to
3 illustrate? Does that not mean that they are, because
4 of their habit of returning to the same areas and
5 using the same areas for their life cycles, that if
6 these areas are disrupted they don't have the ability
7 to go to alternative less impacted areas?

8 A Now that's in part true,
9 but you know, they are what is known as reproductive
10 homers. We're talking for instance about anadromous
11 species, the ones that go to sea and come back to spawn
12 in a particular area. What you find in those species
13 is that there is quite a distinct difference between
14 the habits of the juveniles and the habits of the adults.
15 The ones that have gone to sea but have not yet matured
16 and are coming back to fresh water simply to over-winter
17 but not to spawn, may go to areas some considerable
18 distance from where the actual spawning takes place.
19 In other words, the entire population doesn't necessarily
20 come back to the same area, both to spawn and over-
21 winter. In the case of Arctic char in the Sagavanirto
22 River, for instance, most of the juvenile fish that come
23 back from sea to over-winter are found in the lower
24 reaches of the drainage in the vicinity of the Ivishak
25 River, whereas a large proportion of the spawning actually
26 takes place 50 or 60 miles further upstream, /tributaries
27 upstream. So that if you were to go into an area where
28 there was spawning and you in fact destroyed the entire
29 population of adults as well as the eggs in the gravel,
30 you would still have a segment of that population, of

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2 juveniles which may ave been 50-60 or 100 miles away.
3 In some instances we found fish that we had tagged
4 as spawners on Joe Creek on the Firth River, and found
5 them going uprivers hundreds of miles away in Alaska
6 the following year, so this is another aspect of their
7 resilience.

8 Q All right. Can I turn
9 you to page 26 and 27 of your evidence where you ack-
10 nowledge your preference for the coastal route as
11 opposed to the interior route, and from your evidence
12 you seem to be basing your preference on the conditions
13 in Alaska.

14 A That's right.

15 Q Now, if I just asked you
16 to consider Canadian -- the situation in the Yukon,
17 would you come to the same conclusions?

18 A No, actually looking at
19 the Canadian situation we don't really have a --we
20 don't have a preference for either route if we looked
21 only at the Canadian side. The overwhelming feature of
22 the interior route and the one that leads us to vote
23 against it, is the situation at the Canning River.
24 We feel the pipeline could probably be built without
25 major damage either along the coast or in the interior,
26 in Canada.

27 Q Can I ask some questions
28 on your views toward means to protect domestic fishing
29 sites, and I know that as a biologist your main concern
30 is to protect fish, and as I understand your evidence
you propose doing that by protecting the important

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2 areas that fish use for over-wintering and spawning.
3 But I wonder if we can get your assistance in the pro-
4 blems that may be facing domestic sites, as a result of
5 this project, and I take it that there is -- you'd
6 agree with me that there are some events that can affect
7 a fishing site that won't affect the fish at all, and
8 I'm referring to problems such as heavy siltation in an
9 area which may cause the fish to avoid that area, and
10 no fish are lost as a result but the impact will be
11 felt by the fishing site itself.

12 Do you recognize that as a
13 possible situation?

14 A A situation in which the
15 siltation occurring as a result of some pipeline-related
16 activity drifts on downstream past an area where
17 people are attempting to fish?

18 Q Yes. Can I give you
19 an example of the Great Bear River crossing, the acti-
20 vities on the Great Bear River? That may cause a
21 problem of suspended sediments in the water for some
22 distance so that the fish will tend to avoid the areas
23 around the campsite, the fishing site at the juncture
24 with the Mackenzie.

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1 A It is a possibility. Now,
2 there are references in the literature of fish avoiding
3 silty waters, but on the other hand there are some
4 species which in fact seek out silty waters to enter
5 during the course of their migrations. One of the things
6 that could happen, one of the things that very often
7 happens, is that if the water is very silty, it is
8 much easier to gill net fish than if the water is
9 clear, because they cannot see the gill net and they
10 are more inclined to run into it and be captured, so
11 it depends on the degree of siltation, how much, if the
12 entire Great Bear River by some chance were to become
13 silty, it might in fact improve catches to some
14 extent.

15 Q I take it your review
16 of the domestic fishing sites doesn't isolate those
17 camps where problems are foreseen?

18 A Well, our general recommen-
19 dation is that wherever there is a domestic site very
20 close to the pipeline, that we attempt to move the
21 alignment as far as possible, practicably possible,
22 away from a domestic fishing site.

23 Q So that activities that
24 may cause, and avoid -- may cause some difficulties
25 in the location of the site, won't take place? That
26 is what you are saying?

27 A Well, I don't quite
28 understand what you are saying.

29 Q Well, have you or has
30 the Applicant in general looked at the problems which

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1 may result at fish camps as a result of these activities--
2 I mean, do we know which of the fish camps are more
3 vulnerable to disturbance than others?

4 A In general, as I say,
5 we want to reduce any disturbance in the vicinity of
6 fishing sites. We have not in fact done studies of
7 what is being caught at these sites. We really haven't
8 approached it from that angle, no.

9 Q All right --

10 A Except that we presume
11 the ones that are closest, or right on the alignment,
12 are the ones that are going to be most disturbed.

13 Q What about the relation-
14 ship between important fish areas that are used to
15 support the fish populations that go to Fort Good
16 Hope or the other fish camps along the river, and I
17 am referring to situations where the spawning area,
18 may be -- that results in fish in the Fort Good Hope
19 area -- may be many miles away from the Fort Good
20 Hope area itself. Now, have any studies been under-
21 taken to draw that relationship?

22 A To determine where the
23 fishing -- I am not quite certain that I understand
24 your question.

25 Q To determine the important
26 fisheries areas which support the various camp sites,
27 fish sites, fishery sites, used up and down the Mac-
28 kenzie and in the Delta?

29 A Well, to some extent,
30 but, no, we have not gone out of our way to -- you are

1 asking the sort of question, do we know where the
2 cisco spawn in the Peel River, the cisco that
3 are utilized by the people fishing in the Peel River,
4 no, we don't have that kind of information in general.
5 Now, in some instances we have an idea. We know, for
6 instance, that the grayling that go up the Great
7 Bear River, many of them have their source in the
8 Donnelly River and in Three Day Lake, so in some in-
9 stances we have this kind of information and in other
10 instances we don't.

11 Q Is that a useful area of
12 investigation? I can see that it is not a responsibility
13 of you as a fisheries biologist, but it may be a problem
14 for the company.

15 A I don't -- you see, our
16 approach is to try and protect the fishery and to
17 ensure that we don't have disruption anywhere along
18 the pipeline route and you know, it would be useful,
19 possibly to know exactly and precisely where fish were
20 spawning on the Peel River, but I think that we can
21 do quite well without having that particular piece
22 of information. You know, a scientist cannot have
23 too much information.

24 Q Perhaps I can ask you,
25 Mr. Hemstock, I am concerned about the location of
26 stockpile sites and with the possibility of spills and
27 things of that kind, that are located near fishing
28 camps that are necessary for subsistence fishing for the
29 local inhabitants of the area, and I am wondering just
30 what the company's thinking with respect to this

1 general problem is.

2 MR. MARSHALL: Could you be a
3 little more specific, Mr. Ryder? I am afraid that
4 I am not with you.

5 MR. RYDER: We know that this
6 is a problem which cannot be characterized as a fish-
7 eries problem, because important fish populations may
8 not be affected; but it is a fish camp problem.

9 Now, it doesn't fall in
10 Dr. McCart's area of responsibility, but it does, it
11 seems to me, fall into the company's area of respon-
12 sibility. It is a fish problem that is not Dr. McCart's
13 problem, and I wonder how it is being addressed by the
14 company.

15 WITNESS HEMSTOCK: Well, it would
16 certainly have to be guided by recommendations from
17 Dr. McCart about the location of any facilities on
18 water courses.

19 With regard to, say, wharf
20 facilities, we have tentatively located the proposed
21 wharf facilities now. We would certainly be looking at
22 those on a site specific basis with regard to the
23 problems with fisheries. I was just not aware of any
24 that might have a direct impact on local fisheries.
25 However, that would be one of the factors that would have
26 to be considered on each final location, and with
27 regard to the location of the wharf sites we do have
28 a fair bit of flexibility in the location of those
29 sites.

30 Q What kind of input are you

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1 looking for from the communities to help you in that
2 regard?

3 A About the only information
4 which we have so far is Dr. McCart's study and some
5 preliminary information which was gathered in the
6 early part by some of our consultants.

7 Q Dealing with monitoring,
8 Dr. McCart, during and after construction, that is,
9 if I can refer you to the Environmental Guidelines,
10 which require proposals by the company for an effective
11 pipeline performance monitoring system of inspection,
12 etc.

13 Now, what help can you give
14 us in outlining the essential ingredients for an
15 effective monitoring program? What is needed?

16 WITNESS MCCART: A monitoring
17 program -- there are several things meant by monitoring.
18 In some instances people are talking about simply
19 watching what is happening as the pipeline proceeds and
20 making suggestions for changes if they notice that
21 sedimentation has become excessive or something of
22 this sort.

23 On the other hand, by monitoring
24 you might mean a rather detailed examination of exactly
25 what has occurred as the result of a particular
26 crossing with in my particular field
27 is
28 we would be interested in knowing/ what has happened
29 to parapyton populations, what has happened to
30 benthic invertebrates and what is the extent of sedimenta-
tion downstream and things of this sort. Now, that is

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1 also a kind of monitoring program, but a much more
2 detailed and scientifically oriented one.

3 Q Well, there are really
4 two kinds. One is to monitor the side effects of the
5 activity and the other is to provide some kind of
6 warning mechanism for impending problems which the
7 construction activity may be approaching so that they
8 can get ready to meet them.

9 A Right, and of course
10 Arctic Gas does propose to have a surveillance team
11 in the field, on each spread, to give them warning of
12 what problems might arise to precede the construction
13 teams to some extent so that this kind of warning
14 can be given, as opposed --
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MR. MARSHALL: Mr Ryder, are you referring to a specific one of the pipeline guidelines? I'm just trying to follow the questioning here.

MR. RYDER: Yes.

MR. MARSHALL: Is that No. 10 on page 16?

MR. RYDER: Page 16, right.

MR. MARSHALL: And that's pertaining to the operational period, as I understand.

MR. RYDER: Yes.

WITNESS MCCART: This pertains to the operational period?

MR. RYDER: Well, that one does. Others on page -- further on there is a requirement for monitoring on page 23, for continuous surveillance and maintenance program along the pipeline right-of-way, and then 10, paragraph (b):

"Plans to monitor the environmental side effects during and after construction."

So we know that these monitoring schemes are part of the responsibility cast upon you by the guidelines, or cast upon the applicant. I want to get your views as to what are the essential ingredients for a successful program? Let's deal first of all with the program necessary to monitor the construction, during the taking place of construction.

A As construction is taking place?

A:
Q Yes. / Mr. Hemstock could probably comment further on this, but obviously you have

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1 to have people in the field who can detect potential
2 problems before they occur. They have got to move ahead
3 of the spread. We could make recommendations, we could
4 make site specific recommendations at this point in time
5 -- if I may use that phrase -- but there are going to be
6 situations which arise, as a result of annual variations,
7 there are certain things which we hadn't anticipated
8 and you have to have people who are competent to recog-
9 nize problems, in advance of the pipeline spread. At
10 the same time there are things which are going to occur
11 as construction proceeds and we have to be able to
12 recognize the problem when we see it, and suggest
13 mitigative measures in the field.

14 Q Do you accept that, Mr.
15 Hemstock?

16 WITNESS HEMSTOCK: Yes.

17 Q What size of program do
18 you think we're looking at, in that case?

19 A For the construction
20 monitoring?

21 Q Yes.

22 A We're looking at the
23 requirement for three inspectors, environmental
24 inspectors per spread. We would anticipate nine spreads
25 so we're looking at 27 environmental inspectors.

26 Q And I take it they would
27 work on a rotational basis?

28 A That's right, yes. We
29 would expect that a rough division of their duties, one
30 would be involved with the necessary paper work, in the

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1
2 inspection of the camp and the facilities, and the
3 liaison with governm ent, and other agency inspection
4 teams; and the other man on the job would be required
5 to do what Dr. McCart was describing, that is be out in
6 front and look for potential trouble spots and then
7 also to follow the ditching, construction and so on, to
8 see what was going on on the spread itself.

9 Q I ask you now what you
10 propose for the post-construction period of monitoring?

11 A Well, during the operation
12 and maintenance, I would see the major part of the
13 environm ental monitoring occurring with the routine
14 operation and maintenance surveillance of the pipeline,
15 and that would be -- that would include routinely
16 checking for such things as the caribou migration and
17 so on, the very visible parts of wildlife observations;
18 but it would also include a more detailed monitoring,
19 which would follow up such baseline studies as we
20 have done at Chick Lake, which is our major research
21 site, where we have done a great deal of detailed base-
22 line work. We would plan to follow through with that
23 and carry on the same kind of studies after the con-
24 struction of the pipeline to see what the impact might
25 have been on a more site specific basis.

26 While that is the major site
27 of research, there have also been a number of other
28 smaller sites where more spedfic swork has been done.
29 For instance, I think Dr. McCart's work at Vermilion
30 Creek. We could go back there and see what the impact

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1
2 -- what impact had been registered as a result of the
3 construction of the pipeline.

4 Q Can I ask you, Dr. McCart,
5 to refer back to your evidence last time when we were
6 discussing the recommendations you had to protect
7 water bodies, where you lacked sufficient local knowledge
8 to provide site specific proposals, and you suggested
9 classifying streams. Can you expand on that? What
10 classifications did you have in mind when you gave that
11 as a solution?

12 WITNESS MCCART: Well, an exam-
13 ple of the kind of classification we would have in mind
14 is the paper by Craig & McCart which appears in
15 "Arctic & Alpine Research," 1975, this year, in which we
16 classified streams on the North Slope into three major
17 categories. They are rather broad general categories
18 but we feel that this is a realistic categorization for
19 streams from the Babbage River, at least as far west
20 as the Sagavanirtoq, and we have not attempted this
21 kind of classification in the Mackenzie Valley, but I
22 am fairly certain that the same kind of thing could be
23 done, based in part in seasonal flow characteristics,
24 based in part on water chemistry, based in part on
25 benthic invertebrate populations which are, as a matter
26 of fact, a consequence of the seasonal flow patterns in
27 these streams.

28 Q And do I understand you
29 to say that the measure of protection you would recomm-
30 end depends upon the classification that the stream

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1 would be assigned?

2
3 A The kinds of measures,
4 yes. For instance, we classified some streams as spring
5 streams. These are fed by spring or you see. they run
6 year-round and are a major source of water in streams
7 on the North Slope. We classified another group as
8 tundra or foothills drainages. These typically run only
9 during the summer, and are dry during the course of the
10 winter, so that with winter construction we would
11 recommend quite different approaches to these two kinds
12 of streams. One is running in the winter; one is dry
13 and frozen to the bottom .

14 Q And can this technique
15 be applied to the streams flowing into the valley, into
16 the Mackenzie River?

17 A Yes, I think so, but I
18 think that probably there would be more categories
19 along the valley than there are along the North Slope
20 where there is a rather simpler situation.

21 Q Now, last time you were
22 -- you said that any decision you reached with respect
23 to the requirements for a particular stream, in terms
24 of the measures needed to protect fish that use it,
25 would not vary, depending upon your anticipation of
26 future development; that your decision with respect
27 to a particular water body would be the same, whether
28 you considered the gas pipeline alone or whether you
29 considered the gas pipeline in the context of a trans-
30 portation corridor.

A We want to define

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1
2 "mitigative measures" so that there is an absolute
3 minimum of disturbance to any stream regardless of
4 whether it might subsequently be wiped out as a result
5 of some other kind of development.

6 Q So you wouldn't consider
7 future development, but you might consider past develop-
8 ment which had already impacted the water body.

9 A Well, that's true. I
10 would probably be less concerned about a pond or a
11 lake that had been turned into a sewage lagoon, than I
12 would about one which was comparable in every other
13 way except that it was still in its natural state. But
14 I don't think that I would sit down and make differing
15 regulations for this kind of thing.

16 Q Well, you have to decide
17 whether to protect the stream or not, whether it's
18 worthy of protection.

19 A Well, as I say in our
20 minds all streams are worthy of protection and we want
21 to ensure that a minimum of damage is done. If it's
22 got to be crossed, how can we do it to minimize the
23 effect of the pipeline on that stream?

24 Q You recall last time we
25 discussed in the beginning, three types of research
26 necessary to discharge or to provide enough information
27 to the engineers so that the engineers can satisfy the
28 requirements of the guidelines, and I'm referring
29 specifically to the requirements in the environmental
30 guidelines dealing with river and lake regimes to

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1
2 provide specific proposals that will minimize inter-
3 ference with fish passage or whatever particular con-
4 cern you have. Now, do you agree that these three
5 levels of research are required before you can provide
6 the engineers with sufficient information so that they
7 can come up with the specific proposals required by
8 the pipeline guidelines ?

9 A I must admit that I
10 don't recall the three levels of research.

11 Q All right, I'll just
12 relate them to you again.

13 A Yes.

14 Q The first is a gathering
15 of baseline information.
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1 A Yes.

2 Q And the second is the
3 twofold task of first determining the change in the
4 habitat that you anticipate, as a result of the activity
5 and secondly, determining the tolerance levels of
6 the various species to these changes in habitat.

7 A Yes.

8 Q And then the third level
9 of research, is performed, I take it, by engineers,
10 mainly, to provide the specific methods needed to keep
11 the changes in habitat within the tolerance levels
12 that you have found for fish?

13 A Yes.

14 Q Now, do you agree that
15 the first two levels, the types of research are
16 required to enable you to give the information that
17 the engineers need so that they can provide you with
18 the specific methods necessary to keep the tolerance --
19 necessary to keep the impact within the levels that
20 the fish can tolerate?

21 A Not entirely, because of
22 course this business, you come to this question
23 of what are the tolerance levels of various species.
24 Now, our approach has been to attempt to define
25 mitigative measures to protect even the most sensitive
26 species, so that we feel that if we can protect the
27 most sensitive species in any particular area, we will
28 be in fact protecting those that are more tolerant without
29 having to go through what probably is an impossible
30 task of determining what the tolerance is of the thirty

1 or forty species that are likely to be found along the
2 pipeline route, or every parameter that is likely
3 to change, even temporarily as a result of the construc-
4 tion of this pipeline.

5 Q So you apply these
6 three types of research to the weakest link in the
7 chain then? The weakest species?

8 A Those species which are
9 generally considered the most sensitive.

10 Q Right, and I take it
11 the grayling would fall into that?

12 A Well, there is some
13 question. Without getting into great --

14 Q Was that why grayling
15 eggs were selected for you methanol tests?

16 MR. MARSHALL: He hasn't
17 answered the question.

18 A The difficulty, as I
19 was going to say, is that it is very difficult to
20 know exactly what is sensitive among those species
21 along the pipeline route and just let me make the
22 point that species which may not be intolerant, or
23 may be very tolerant in southern Ontario, such as the
24 pike, may in fact, at the periphery of their range in
25 the Mackenzie Delta, be rather intolerant of environmen-
26 tal changes, so it is very difficult to say that because
27 a species is tolerant of a particular environmental
28 insult in one area, that it is also going to be tolerant
29 over its entire range.

30 So to answer your other question,

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1 the reason we chose the grayling is because it is the
2 most common species over the length of the pipeline in
3 the most -- found in more streams than any other -- if
4 you look at the entire length of the pipeline in
5 the Northwest Territories and in the Yukon and in
6 addition to that, of course, it is also an important
7 sport species.

8 Q Well, whether you picked
9 the most sensitive species or not, I take it we are in
10 agreement that these three levels of research are
11 necessary to enable the engineers to produce the kinds
12 of methods and techniques required by the guidelines?

13 A We have to -- again, it
14 boils down to this question of what tolerance limits
15 are. We have had an estimate of what the tolerance of
16 various species is, or what the tolerance of fish
17 in general to a particular form of environmental
18 change is, yes.

19 Q So we agree that the
20 tolerance level is information that is worth acquiring?

21 A It isn't necessarily
22 something that you have to do de novo. It is the
23 kind of information that is available in large part in
24 the literature already. You have to certainly have an
25 idea of what their tolerance might be.

26 Q Are you satisfied -- you
27 said last time that the bulk of your work was directed
28 to the gathering of base line information and I wanted
29 to know whether you are satisfied that you have
30 given the Arctic Gas engineers sufficient data to

1 enable them to produce the methods of control that
2 are required by the guidelines?

3 A Well, we have certainly
4 led an experimental work in what I consider to be
5 the three major areas where tolerance may have to be
6 established. Number one, we have looked at sedimenta-
7 tion. Number two, we have looked at methanol and its
8 toxic effects and we are still continuing our work in
9 that area; and number three, we have also done work on
10 the tolerance of Arctic char to low oxygen levels.

11 Q Can you point me to your
12 work on sedimentation?

13 I didn't know that we
14 had tolerance levels of fish to sediment loads.

15 A Well, we have done
16 experimental work, we have not looked at the tolerance
17 of these things to suspended sediments. We have
18 looked at the effects of sedimentation on benthic in-
19 vertibrate populations specifically because we feel
20 that these are far more sensitive, in general, to this
21 kind of change than are fish populations.

22 Q Then I take it in any
23 event with sedimentation, your approach is to minimize
24 it no matter what the tolerance levels of fish may be?

25 A That is right.

26 MR. RYDER: Thank you, Dr.
27 McCart. I have no further questions on that subject,
28 Mr. Commissioner.

29 MR. SCOTT: Mr. Commissioner,
30 we now come, I think, to Mr. Hollingworth on the

1 ultimate cross-examination. I understand from Mr.
2 Hollingworth that he is only prepared today to cross-
3 examine on the subject of birds. Other participants
4 are prepared to cross-examine on the full range of
5 topics that remain and we will fit Mr. Hollingworth in
6 little later on in the balance of the topic.

7 THE COMMISSIONER: All right.

8 MR. HOLLINGWORTH: I am
9 sorry, Mr. Commissioner. I am a bit confused as to
10 what the arrangement was in the last portion of this
11 phase, but I am expecting my advisor up tonight or
12 tomorrow and I hope we'll keep the questions very
13 much to a minimum on the other topics.

14 CROSS-EXAMINATION BY MR. HOLLINGWORTH:

15 Q Dr. Gunn, I would like
16 to discuss primarily the subject of the peregrine
17 falcon with you and I take it that you would agree
18 with me that it is a rare and endangered species?

19 WITNESS GUNN: Yes.

20 Q And therefore, that
21 anything reasonably possible should be done to
22 protect it?

23 A Right.

24 Q And this is true not
25 only from industrial or construction activity, but
26 even from surveys of nesting sites during a sensitive
27 season?

28 A Yes, that is so.

29 Q And I understand that
30 that is to be about mid-May to mid-September?

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1 A In some cases it would be
2 as early as the beginning of May.

3 Q Well then, could we say
4 the beginning of May until mid-September?

5 A Right.

6 Q And you would agree with
7 me on that.

8 Well, do you support the
9 principle of those concerned about peregrine falcons
10 should pool the information that they have so that
11 surveys and studies avoid duplicity and are kept to a
12 minimum?

13 A I think it depends on
14 what surveys are being done and by whom. The whole
15 subject of peregrine falcons is very sensitive because
16 the birds themselves have some price on their heads
17 and I wouldn't agree to widespread dissemination of
18 knowledge of where they are nesting and what they are
19 doing unless I were very sure that the person
20 to whom the information is being given would be able
21 to keep control of that information.

22 Q Well, assuming that you
23 got that assurance, would you then agree with the
24 general principle that I have enunciated.

25 A Yes, I would.

26 Q I take it that you follow
27 that principle when you have worked in co-operation with
28 the Canadian Wildlife Service?

29 A Yes, we did.

30 Q And I understand that in

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1 this program that you have, let's say, co-operated in
2 common cause with the Canadian Wildlife Service who
3 have permitted you access to their working files on
4 known nest sites of peregrine falcons?

5 A No, we have not had
6 access to their working files.

7 Q Have you had access to
8 their information as to the location of peregrine
9 nesting sites?

10 A We have had access to
11 some of their information, where it is pertinent to
12 the proposed pipeline.

13 Q Let me rephrase that.
14 Within a reasonable proximity of the proposed pipeline
15 route and let's say five miles on either side throughout
16 the length of the route, has the Canadian Wildlife
17 Service provided you with a list of known nesting
18 sites of peregrine falcons?

19 A Yes, they have on a
20 confidential basis.

21 Q I assume that probably
22 one of the reasons for this would be so you could
23 avoid disturbing the peregrine falcons, in work which
24 duplicated essentially what the Canadian Wildlife
25 Service had done?

26 A Well, we quite early
27 decided on a policy that, inasmuch as the Canadian
28 Wildlife Service was studying these nests, it was not
29 necessary for us to do so too, and we could rely on
30 their information as to what was happening to them and
thus we needn't duplicate the work that they were doing.

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1 MR. SCOTT: I have some
2 difficulty hearing Dr. Gunn.

3 MR. HOLLINGWORTH: Yes, I have
4 too.

5 MR. SCOTT: Is he not close
6 to the microphone or isn't it turned on sufficiently
7 loud?

8 WITNESS GUNN: I'm not sure
9 that it's on. Is that any better now? It's switched
10 the other way.

11 MR. HOLLINGWORTH: Q And would
12 I be correct in assuming that you also have contributed
13 your information to the general reservoir of knowledge
14 on these birds that the Canadian Wildlife Service has?

15 A Yes, that's true.

16 Q Do you know if Canadian
17 Wildlife Service extends this same program and courtesy
18 to other biologists interested in the peregrine falcon?

19 A I don't know.

20 Q Now, on page 45 of your
21 evidence, Dr. Gunn, reference to 11 raptor nest-sites
22 within 3 miles
23 of the proposed Arctic Gas route, how many of those
24 are peregrine falcon sites? That's in the first
25 complete paragraph.

26 A This is pertaining to
27 the area from the Mackenzie Delta southward, I think
28 that's the reference in the paragraph. I would think
29 that more than half are peregrine falcons.

30 Q Is there any way you can
check on that and be more specific with an answer later

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1 on, sir?

2 A Yes, we can do that.

3 Q Fine. Would you know how
4 many of these peregrine falcon sites would be in the
5 Campbell Hills specifically?

6 THE COMMISSIONER: Dr. Gunn,
7 if you are concerned about any of these questions,
8 getting too close to information you regard as confi-
9 dential, don't hesitate to say so.

10 A All right, sir. I'd
11 like to say two things about this. First of all, the
12 pipeline in the Campbell Hills area does not approach
13 very closely, all the peregrine falcon nests there.
14 Then secondly, it is known to be one of the -- or has
15 been one of the greatest concentration areas of falcon
16 nest-sites in North America, and thirdly, Canadian
17 Wildlife Service would like to maintain confidential
18 the figure of active nest-sites there. The information
19 is available or could be made available if the Canadian
20 Wildlife Service wishes to release it.

21 MR. HOLLINGWORTH: Now what
22 are the other raptors whose nest-sites are included in
23 that figure of 11 that's on page 45? In other words
24 other than peregrine falcons?

25 A Well, I can give you
26 the precise breakdown when I give you the rest of the
27 information.

28 Q Thank you, sir. Now,
29 again this is all with reference to the caution that
30 the Commissioner has just given, but throughout the

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1 length of the prime route from Prudhoe Bay to the 60th
2 Parallel, can you tell me the shortest distance from
3 the proposed CAGSL route to a peregrine falcon nesting
4 site ?

5 A I don't think the route,
6 that is the right-of-way, is sufficiently clearly
7 defined to give you a measurement in say yards, but
8 there are certainly some within two miles, and probably
9 some within one mile.

10 Q And if I asked that
11 question with reference to compressor station sites,
12 could you give me an answer?

13 A I think I would have to
14 check that in order to give you an accurate answer on
15 that.

16 Q Thank you, and from a
17 proposed airstrip?

18 A I think that that would
19 come out to be the same as from compressor sites because
20 the airstrips which are close to peregrine falcon
21 nests tend to be ^{at} compressor sites.

22 Q Would you check on that
23 and let me know? Now, has there been an instance
24 where either the pipeline route or rather any of the
25 pipeline route\$ or a compressor station site or an
26 airstrip site has been moved to lengthen the distance
27 from a peregrine falcon nesting site?

28 A Not that I know of. At
29 present we have notified Arctic Gas that there are
30 conflicts in some areas and these are to be looked at

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1 to see what accommodation can be made. As far as I know,
2 no decisions have been made to this point.

3 Q Are you in a position to
4 tell me where those locations are?

5 A The two I could think of
6 are compressor sites CA-09, I think it is, and M-9 and
7 M-11 on the Norman Range.

8 Q Now, are any of the
9 components I've been discussing, the pipeline or a
10 compressor station site or an airstrip site within
11 such a short distance of a nesting site that in your
12 opinion something has to be done to avoid potential
13 harm to ^a peregrine falcon?

14 A It is our recommendation
15 that whenever a peregrine falcon site is within 2 1/2
16 miles of either the route or a compressor station, that
17 efforts be made to move the line or the site to prevent
18 impact on the peregrine falcon site.

19 Q Well, are certain moves
20 recommended by you to stay within that rule then?

21 A I think that in the case
22 of the two that we have mentioned, there is difficulty
23 in moving them, and we have recommended that the con-
24 struction on the compressor site be undertaken in the
25 winter rather than in the summer, which is the normal
26 -- is to be the normal procedure.

27 Q They are the two trouble-
28 some spots in that regard?

29 A Yes. It will be prefer-
30 able if a site can be moved; if there are cogent

Banfield, Gunn, Hemstock
McCart, Jakimchuk
Cross-Exam by Hollingworth

1 reasons why a site cannot be moved, then our recommen-
2 dation is that construction be during the winter rather
3 than during the summer.

4 Q Now in the event that
5 this winter construction program were not to be carried
6 out, and the components weren't moved, what do you
7 predict would happen?

8 A It's very hard to say
9 what will happen because experience has been very
10 variable. Some birds can endure considerable disruption.
11 Other birds do not appear to, so there is no hard and
12 fast evidence to show you what is likely to happen.
13 You can expect that some birds will not endure and
14 that some birds will. But you can't say which are going
15 to be which.

16 Q I understand that the
17 essential concern with reference to disturbance is the
18 possible loss of a year's hatch. Would that be right?

19 A I think it goes beyond
20 that.

21 Q How does it go beyond
22 that?

23 A The site itself is
24 traditionally used, it may not be used every year but
25 it may be used quite a few years, out of say ten years,
26 and that while it would be important not to lose a
27 year's hatch, it would be more important if the effect
28 were to cause the birds to abandon that site completely.

29 THE COMMISSIONER: If the birds
30 abandoned that site completely, what's the problem?

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1 Would the birds be unlikely to discover a new site
2 suitable for nesting in the subsequent year?

3 A I've seen some evidence
4 that would agree with that, sir. There do not
5 appear to be very many suitable peregrine falcon sites
6 in our area. They have to have not only a good ledge
7 for nesting, it also has to be in an area where there
8 are enough prey species to support it. So you have to
9 have a combination of the two, and it's not easy to
10 find those ones that have not already been used.
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McCart, Jakimchuk,
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1 THE COMMISSIONER: Right.

2 MR. HOLLINGWORTH: Q I take
3 it that if you lose a year's hatch with a relatively
4 small number of birds of a particular species, it is
5 important in respect to the overall population? It
6 has to be, doesn't it?

7 A You are talking now
8 about the hatch from one nest site?

9 Q Yes.

10 A I think that would only
11 be the case if the overall population were extremely
12 low. I question whether the loss of one nest site,
13 one hatch at one nest in one year would have a signifi-
14 cant effect on the peregrine population.

15 Q Now, to deal with the
16 disturbance from aircraft, looking at page 39 of your
17 prepared testimony, in the last complete paragraph,
18 you state in the second and third line:

19 "Helicopters at 1,000 feet were more
20 disturbing to birds than fixed wing
21 aircraft."

22 Were the fixed wing aircraft also flying at 1,000
23 feet?

24 A Yes.

25 Q But looking now at
26 volume 14 of the Biological Report Series, I refer
27 you to page 189, and I interpret the last paragraph
28 on 189 that goes over to 190 as saying that you don't
29 have enough information to draw conclusions as to the
30 relative effects on black brants, geese or on Arctic

1 Tern. Is that a fair assumption?

2 A That assumption appears
3 to apply to black brant, is that what you said? And
4 Arctic Tern? Q And Arctic Tern?

5 A No, it says of the
6 three remaining species the Arctic Tern proved to be
7 the most sensitive to both forms of aerial disturbance,
8 is that right?

9 Q All right, so it is
10 referring only to black brant. They don't have enough
11 information to draw a conclusion.

12 A It does say here, however,
13 that 500 was the greatest altitude tested for a fixed
14 wing aircraft --

15 Q I was going to come to
16 that in a minute. I understand, and they didn't
17 fly a fixed wing aircraft over 1,000 feet in this
18 test --

19 A That is what it says here,
20 right.

21 Q And on page 167 of the
22 Biological Report Series, there is a reference, well,
23 I don't know that you necessarily need to look it up,
24 maybe you would agree with me. It states that a
25 heli copter did not effect incubating eider ducks.

26 A On page 167?

27 Q Yes.

28 A No eiders have appeared
29 to have been disturbed by the helicopter flights?

30 Q Yes.

1 A All right.

2 Q And then further down

3 it states:

4 "It is apparent from these experiments .
5 that nesting eiders will not flush from a
6 nest unless subjected to extreme dis-
7 turbance."

8 A All right.

9 Q Then on page 182 there
10 is a similar reference made with fixed wing aircraft
11 with respect to the common eider.

12 A Right.

13 The reason for this, perhaps
14 you would like me to explain that. The reason for
15 this is that the eiders were sitting on eggs and
16 they stuck it out very well. The disturbance had
17 to be extreme before you would drive an eider duck,
18 who is incubating eggs, off its eggs. Other birds on
19 the strip that were not incubating eggs, had much less
20 tolerance. They flew off when the aircraft were at
21 greater heights or much less tolerance to human dis-
22 turbance too.

23 Q Well, was there a com-
24 parison between those other breeds with respect to
25 helicopters and fixed wing aircraft, other than the
26 ones that we have been discussing?

27 A I imagine we could find
28 something on glaucous gulls here.

29 Q Well, I agree with you
30 there. Glaucous gulls were more disturbed by helicopters

1 than fixed wing aircraft, that is the case, isn't it?

2 A Table on 185 gives the
3 response from non-incubating glaucous gulls to
4 fixed wing aircraft, but it doesn't give response
5 to helicopters; however, table 10 does. By comparing
6 these two tables we can get some idea of what happened.
7 Table 10 incidentally, shows aircraft height at
8 Phillips Bay, fixed wing at 1,000 feet.

9 Q Well, what I am concerned
10 with is this, Dr. Gunn, you have got the statement on
11 page 39 that helicopters are more disturbing to birds
12 than fixed winged aircraft and I am just wondering
13 what birds you are speaking of when you make that
14 reference.

15 A Well, in this particular
16 experiment the birds that were there in most numbers,
17 where you could rely on results, were glaucous gulls.
18 There were other birds there, but in smaller numbers.
19 There were a number of Arctic Terns, but the other
20 species were there, black brant, eider, were there in
21 only very small numbers.

22 Q Well, I understand that
23 peregrine falcons, eagles and ospreys are not affected
24 as badly by turbine helicopters as they are by fixed
25 wing aircraft, is that correct?

26 A Peregrine falcons, eagles
27 and ospreys?

28 Q Mm-hmm.

29 A Are not affected as much
30 by turbine fixed wing aircraft --

1 Q Turbine helicopters, as
2 they are by fixed wing aircraft.

3 A We don't have any direct
4 evidence, or we have no experimental evidence on that.
5 I do know, however, that we have reliable stories of
6 gyr falcons actively diving on helicopters.

7 Q Well, are you familiar
8 with the work by White and Sherrod of 1973 entitled
9 "Advantages and Disadvantages of Rotor Winged Aircraft
10 in Raptor Surveys"?

11 A I believe I have read that,
12 yes.

13 Q Well, doesn't that make
14 the statement that peregrine falcons, eagles and ospreys
15 are not affected as badly by turbine helicopters as they
16 are by fixed wing aircraft?

17 A Well, if you say it
18 does I am sure it does. However, that experiment, that
19 work applies, I think, to the Aleutians and to Alaska, not
20 to the area where we are working in.

21 Q In the instances where
22 you found helicopters more disturbing to birds than
23 fixed wing aircraft, do you have any explanations as
24 to why that is?

25 A There are two factors
26 here I think to consider. One is the noise resulting,
27 occurring from the -- arising from the aircraft, and the
28 other is the configuration of the aircraft, the shape
29 of it.

30 Q Well, now, coming back

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Cross-Exam by Hollingworth

1 a minute, you have stated that White and Sherrod's study
2 was in the Aleutian Islands, but I understand that with
3 respect to peregrine falcons at least, that the Canadian
4 Wildlife Service has reached the opposite conclusion
5 from you, that they find fixed wing aircraft more dis-
6 turbing than helicopters to peregrine falcons.

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McCart, Jakimchuk
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1 A All I can say is we
2 have not done comparative experiments on which are
3 more disturbing to peregrine falcons. We have done some
4 experiments with gyr falcons with helicopters, and we
5 now have some idea of where the threshold disturbance
6 is there.

7 Q And did you find that
8 gyr falcons were disturbed more by fixed wing aircraft
9 or by helicopters?

10 A The figures that I recall
11 pertained to helicopters, and I'm not sure that I can
12 recall what happened with fixed wing aircraft.

13 Q Well, are you familiar
14 with the conclusions reached by the Canadian Wildlife
15 Service that again, in the case of the gyr falcon, they
16 found that the fixed wing aircraft more disturbing than
17 helicopters?

18 A I think I have heard them
19 speak of that, yes.

20 Q And have you heard them
21 speak of the conclusion they reached with respect to
22 peregrine falcons?

23 A No.

24 Q Now, when you were conduct-
25 ing your experiments with snow geese, and the effects of
26 helicopters and fixed wing aircraft, what type of
27 aircraft were used specifically?

28 A We have that detailed
29 information in Volume 27 of the Biological Report series.
30 If I may, I'll refer to that.

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1 Q Would you give me a --
2 pardon sir?

3 A In chapter two of Volume
4 27, page 5, under "Methods" and having to do with the
5 experimental overflights, it states that we used as
6 fixed wing aircraft a Cessna 185, and as a helicopter,
7 a Bell 206-B.

8 Q Did you use a large
9 aircraft as well as a Cessna?

10 A No, but during these
11 experiments while we were watching the goose flocks,
12 we kept track of the results of what happened whenever
13 any type of aircraft went over, and we categorized these
14 too. This is also reported in here. We divided those
15 into large aircraft, medium aircraft, and small air-
16 craft, and small helicopters. We didn't see any other
17 types of helicopters.

18 Q Now, in your opinion
19 was the disturbance caused by the turbine whine, or
20 visual impact, or something else?

21 A I don't think we were
22 able to reach any conclusion on that. The conclusion
23 we did reach was that the birds were disturbed by
24 helicopters from a greater distance but that fixed
25 wing aircraft caused them to fly farther and take a
26 little longer to settle down than helicopters did.

27 Q Well, sir, isn't it a
28 fact that the avian response to aircraft varies with
29 the species, the time, the season, perhaps also with
30 previous exposure?

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1 A Very much so.

2 Q And I think you said that
3 some of the birds flushed earlier with helicopter
4 approaches than with fixed wing approaches generally.

5 A That's right.

6 Q But by the same token
7 they would remain disturbed for a longer period with
8 fixed wing disturbance than with a helicopter disturbance.

9 A That's true.

10 Q And the calculations
11 indicated that if disturbance from a Cessna increased
12 to .5 flights per hour, the energy lost by juveniles
13 reached 20.4%.

14 A That's true.

15 THE COMMISSIONER: What was
16 that last statement?

17 MR. HOLLINGWORTH: The calcula-
18 tions that Dr. Gunn and his associates reached were
19 that if disturbance with a Cessna increased to .5
20 flights per hour, the energy lost by juveniles
21 reached 20.4%.

22 A That would be assuming
23 other things remained equal.

24 Q But the corresponding
25 traffic of B206 helicopters would cause the energetic
26 reduction of 9.5% with juveniles.

27 A Right, right.

28 Q So really feeding snow
29 geese would be, disturbed regularly, would be more
30 affected by a light fixed wing aircraft than by a light

Banfield, Gunn, Hemstock
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Cross-Exam by Hollingworth

1 turbine helicopter.

2 A That's what the figures
3 show, yes.

4 THE COMMISSIONER: You're
5 satisfied, I take it, Dr. Gunn, that the work that
6 you and your people did is sufficient that these
7 statements that Mr. Hollingworth has made that you've
8 just agreed to, are sound. There's no --

9 A Yes sir, we are satisfied
10 with this series of experiments, but as Mr. Hollingworth
11 said, the effect on each species is quite likely to be
12 quite different, and this applies to snow geese.

13 MR. HOLLINGWORTH: Q So your
14 conclusion that aircraft are less disturbing than
15 helicopters is an overall one because certainly with
16 snow geese it's difficult to say, in light of the figures
17 we've just been discussing.

18 A In the case of snow
19 geese, it appears that fixed wing aircraft are more
20 disturbing.

21 Q And this is also the
22 case with certain other aircraft, or at least there is
23 some difference of opinion between you and other know-
24 ledgeable people in the field. I'm referring now to
25 peregrine falcons, gyr falcons, osprey.

26 A In the case of other
27 aircraft or other birds?

28 Q Other birds.

29 A That is the evidence they
30 have produced. We haven't studied that particular aspect

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1 of it. It's my general opinion, however, from my
2 own experience that most birds appear to be more
3 affected by helicopter than by an aircraft, fixed wing
4 aircraft.

5 Q Well now, you've recommen-
6 ded a minimum altitude of 2,000 feet for aircraft above
7 ornithologically sensitive areas. Is that correct?

8 A Right.

9 Q And do you include raptor
10 nesting sites in your expression -- let me get this
11 right - - "ornithologically sensitive areas"?

12 A Yes.

13 Q And has your recommendation
14 been accepted by Arctic Gas?

15 A Yes, it has.

16 Q Well, Mr. Hemstock, do
17 you regard a 2,000-foot minimum as practical for the
18 one to three flights a week for compressor station
19 servicing that you're suggesting, or the one to three
20 flights per month for pipeline inspection?

21 WITNESS HEMSTOCK: We do for
22 the servicing of the compressor stations. We realize
23 that the inspection of the line should be done at lower
24 altitudes. That will be a special case.

25 Q So in other words, it's
26 difficult to accept Dr. Gunn's recommendations on
27 pipeline overflights.

28 A Well, the servicing
29 flights and that sort of thing, we accept it; but for
30 the inspection which must -- which requires a visual

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observation of pipeline right-of-way, we would want

3

to fly that at lower altitudes.

4

5

THE COMMISSIONER: The inspection, you intend, should be done in a fixed wing aircraft?

6

7

A We had intended to do it by fixed wing aircraft, yes.

8

9

Q That's the way in which inspection is carried out of pipelines in Southern Canada, I take it.

10

11

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A Yes. We recognize the problem of disturbance and we are quite prepared to vary the inspection times to the best available time within the required window that requires an observation.

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Q The Foothills, as I understand it, intends to carry out its inspection by helicopter. Maybe I got that wrong but I think that's -- at any event, have you considered whether it is practical to use fixed wing aircraft say on the North Slope as opposed to helicopters? The sudden appearance of bad weather, fog and so on, has all of that been taken into account, the exigencies that might make it far safer to be using a helicopter? What I'm really getting at is has there been any consideration given to the likelihood -- maybe it has been considered and rejected -- that you might be forced to use helicopters to do this job properly?

1 A My experience has been
2 that we have had a good deal of difficulty with helicop-
3 ters at the very low temperatures --

4 Q Oh, I see --.

5 A And I would personally
6 prefer to use fixed wing aircraft, but we have other
7 people who are much more expert in that area and they
8 are recommending aircraft and servicing to us. So far
9 it has been fixed wing aircraft.

10 MR. HOLLINGWORTH: Q Can you
11 tell me what kind of aircraft you are going to use for
12 the two functions that we have mentioned, servicing
13 compressor stations and inspection of the line?

14 A I am sorry, I can't
15 tell you, but I think that we can get that information.

16 MR. MARSHALL:
17 There is a report that
18 we have available in the office by a consultant named
19 Avcon that I think has that sort of information for the
20 Inuvik district -- I beg your pardon?

21 MR. HOLLINGWORTH: Information
22 for what district?

23 MR. MARSHALL: The Inuvik
24 district.

25 MR. HOLLINGWORTH: Well,
26 perhaps I could take a look at that.

27 Q Now, I gather, Dr. Gunn,
28 that your preferred maximum frequency of flights over
29 snow geese areas during the staging period from mid-
30 August to early October is one every four hours?

1 WITNESS GUNN: We selected
2 that figure because it happened to be the figure that
3 we arrived at, when we were measuring aircraft flights
4 during the staging period and the geese seemed to be
5 able to tolerate that amount, so that we used that as
6 a basis for saying that, providing you could space your
7 aircraft, they apparently can stand a frequency of one
8 flight per four hours in daylight hours.

9 Q Well, as a practical
10 matter, do you regard that figure as capable of
11 achievement taking into account all other people that
12 might be flying in the area?

13 A Yes, I do.

14 Q Even during the construction period?
15

16 A That is for the staging
17 period for geese. That is only from, say, August 15
18 to the beginning of October.

19 Q Now, do you have any
20 reservations or qualifications to the impact statement
21 that has been put out by Arctic Gas with respect to
22 birds?

23 A Yes, I have one or
24 two. I read it over again last week and I think that
25 when the appropriate time comes it needs to be reread
26 from the point of view of looking at the cross-delta
27 approach; that's not now, but I think that needs to be
28 done in the future. After all, it was written in 1973
29 and things have happened since then. There are a number
30 of general statements in there that need to be re-

1 evaluated to make sure they apply equally to the cross-
2 delta.

3 Q What possible reservations
4 or qualifications do you foresee with respect to the
5 cross- delta route?

6 A Well, I have quite a
7 bit to say on that and it is up to Mr. Commissioner, if
8 you would like me to go into that. I expected, however,
9 that you would prefer to leave it until the January
10 hearings.

11 THE COMMISSIONER: Isn't
12 that better, Mr. Hollingworth -- looking -- is that better,
13 Mr. Scott?

14 MR. HOLLINGWORTH:
I am quite agreeable
15 Mr. Commissioner, as long as Dr. Gunn is going to be
16 at the cross- delta hearings. I understand from his
17 answer that he will be.

18 A Yes.

19 MR. HOLLINGWORTH: Fine, those
20 are all the questions that I have.

21 THE COMMISSIONER: Thank you.
22 Let's adjourn for tea.

23
24 (PROCEEDINGS ADJOURNED)

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McCart, Jakimchuk
Cross-Exam by Bayly

(PROCEEDINGS RESUMED PURSUANT TO ADJOURNMENT)

CROSS-EXAMINATION BY MR. BAYLY:

Q Dr. Gunn, if I may begin with some questions for you, sir, I had some for Dr. McCart but I see that he's left us for a few minutes. Could I refer you please to page 30 of your prepared evidence, and I'm referring here to really the terms under which you conducted your studies, and it appears from this that you have done a number of different things, and I'd like you to address yourself to the definitions of them so that I can be clear in my mind just what they were. I understand some of them were surveys of populations, counting populations in a certain district by photographic means and by running transects, etc. Is that correct?

WITNESS GUNN: Yes, that's correct.

Q And in addition to -- that for example, No. 1 could really be called a survey. That is a study of distribution and numbers of birds in certain areas. Is that correct? Did you study anything under No. 1 besides the numbers and distribution of certain kinds of birds?

A I think you could lump it all under those two headings. There are some migration studies and so on, but no disturbance study.

Q Yes. There are other kinds of studies which would -- and may or may not have been done in the various projects undertaken for this particular applicant, but studies which looked into

Banfield, Gunn, Hemstock
McCart, Jakimchuk
Cross-Exam by Bayly

1 the life history of birds, and that includes their
2 nesting habits, their migratory habits, their sex
3 habits, and locations of all these various parts of their
4 life scheme.

5 A Right.

6 Q And they are different
7 from just looking at the birds where you find them and
8 counting them. They involve going through all the
9 stages that a bird would go through.

10 A I'm sorry, I don't
11 follow your question.

12 Q All right.

13 A Would you re-state the
14 question, please?

15 Q All right. Some studies
16 of birds involve studying a species and all its habits.

17 A Right.

18 Q No matter where they are
19 located. For example you might study snow geese from
20 the time they leave Banks Island to the time they return
21 again, and that might cover the better part of a
22 continent in length.

23 A Right. We have in fact
24 done something like that for whistling swans.

25 Q Yes, and then there are
26 other kinds of studies, the kind you just referred to
27 when I asked the first question, and those are studies
28 that look at the effects of certain things on birds,
29 and you used the example of disturbance by either
30 aircraft or the other example you've given us, disturbance

Banfield, Gunn, Hemstock
McCart, Jakimchuk
Cross-Exam by Bayly

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2

by simulated compressor station noise-makers.

3

A Yes.

4

Q Now, I gather from your

5

preliminary remarks that you had to gather a large

6

amount of baseline data for this study at the initial

7

stages that you went into for this applicant.

8

A That's true.

9

Q And that was the result

10

of there not being a great deal known about certain

11

species, their distributions and their habits, in the

12

location where the applicant wanted to place the pipe-

13

line.

14

A Yes.

15

Q And when you undertook to

16

gather this data, it was for the purpose of, first of

17

all, telling you what birds were in the area at certain

18

times, is that correct?

19

A Yes.

20

Q And to give you an idea

21

of their numbers.

22

A An approximation, yes.

23

Q Yes, and then to give you

24

an idea of what sort of populations, what species you

25

could successfully study, both from the point of view

26

of there being a large enough number of them and from

27

the point of view of their being representative of

28

certain characteristics, perhaps, of all birds. Would

29

that be a fair statement of the way you --

30

A No, I don't think we made

Banfield, Gunn, Hemstock
McCart, Jakimchuk
Cross-Exam by Bayly

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2

that approach.

3

Q All right. What I'm

4

concerned with is what takes you to the step of

5

deciding which birds you are going to study from the

6

point of view of doing your particular experiments?

7

A Well, perhaps two

8

different approaches to that. One is that we went out

9

and looked at birds at representative areas along the

10

proposed pipeline route, and what birds and what numbers

11

we found there; we found some of them would be more

12

numerous than others, and in those cases it would be

13

easier to do statistical studies, for example.

14

The other approach is that we were particularly inter-

15

ested in finding out areas of concentrations of birds,

16

concentrations that took place at a particular time or

17

season, because when you have assemblies of birds such

18

as this, they tend to be easily subject to disturbance.

19

So that gave us another approach to deciding what

20

birds we wanted to look at, where and when.

21

Q So you would look for

22

birds in a certain density to be able to study certain

23

effects. Does that refer to what is generally called

24

colonizing species?

25

A Not necessarily. Coloniz-

26

ing is usually referred to -- refers to the nesting

27

period where birds nest close together as a colony, but

28

non-colonizing birds may group in fairly dense flocks

29

at other times of the year.

30

Q Well then, could we

Banfield, Gunn, Hemstock
McCart, Jakimchuk
Cross-Exam by Bayly

1 characterize the Lapland longspur as one of those
2 birds that may nest in a fair density or a significant
3 density in a certain area without being colonizing birds?

4 A Yes.

5 Q And for that reason you
6 found them suitable subjects for some of your disturb-
7 ance studies. Would that be fair to say?

8 A No, that's not the approach
9 that we took. The approach that we took was to do the
10 disturbance studies in a given area, in a given habitat,
11 and as it turned out, the Lapland longspurs, proved to
12 be more numerous in those areas than other species.
13 We didn't go out, we didn't plan the study to see its
14 effect on Lapland longspurs. We planned the study to
15 take place in a certain habitat, to see what happened
16 to the birds there, and of the various birds there
17 the Lapland longspurs were there in sufficient numbers
18 to make it reasonably easy to do statistical studies
19 of them.

20 Q So they are the birds
21 for which you can get statistically significant studies,
22 but that, I gather, isn't the only measure of signi-
23 ficance in ornithological studies. In other words, you
24 can study a rare and endangered species even though it
25 doesn't have a large population in a given area.

26 A Right.

27 Q But you don't use -- you
28 can't do certain kinds of experiments that would be
29 based on the effects on 80%, 90% of a species.

30 A It's more difficult.

Banfield, Gunn, Hemstock
McC art, Jakimchuk
Cross-Exam by Bayly

1

2

It's a question of sample size.

3

Q Yes.

4

A If you're working with

5

rare and endangered species, your sample size is

6

normally very low. If you work with a common species

7

such as a Lapland longspur, then your sample size can

8

be quite high in a reasonable easily worked area.

9

Q And some of the reason,

10

of course, to stay away from certain species is the very

11

fact that they may be rare and endangered. That's why

12

you satisfy yourself that the search that has been

13

done already by other people so that you don't add to

14

the disturbance.

15

A That was the case with

16

the peregrine falcon, yes.

17

Q Yes, now if I can refer

18

you to Volume 29 of the Biological Report series.

19

A I have it.

20

Q Have you, and I'm referring

21

to the abstract at page little (i), chapter 1, and the

22

second paragraph reads -- and I'll read this for the

23

record:

24

"The purpose of these comparative surveys is

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to gather data that will enable specific recom-

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mendations to be made concerning the use and

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management of the study area, and that will

28

serve as a baseline of information for assess-

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ment of impact should the pipeline be constructed."

30

Now --

Banfield, Gunn, Hemstock
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A This was our -- I'm sorry,
I don't find you. This is on?

4

Q I have Volume 29.

5

A Yes.

6

Q Chapter 1.

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A Chapter 1, page --

8

Q Page small (i).

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A -- small (i), all right,

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I have small (i), small (i).

11

Q And it's the second

12

paragraph.

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A Yes, I have it now.

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7 A I think our reasoning
8 behind the study, which probably shows in the introduc-
9 tion, is that lakes are an important feature of the
0 North Slope and we wanted to know something about the
1 productivity of those lakes and the effects of dis-
2 turbance on the birds that use those lakes.

17 A That is correct.

21 A Well, what we got from
22 this study primarily was that we found out what kinds
23 of lakes were particularly productive and what kinds
24 of lakes were not particularly productive and we felt
25 that this was important to the Applicant in a number
26 of ways. One is that if he were to set up camps in the
27 area, camps usually set up beside a lake cause some
28 disturbance, we could predict what kinds of lakes would
29 be less productive for waterfowl and other kinds, and
30 therefore, would be more suitable for camps; and similarly

Banfield, Gunn, Hemstock,
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1 if aircraft on floats were to be used and landed on these
2 lakes, we could make the same prediction for that.
3 However, we were subsequently told that the Applicant
4 is unlikely to use float planes.

5 Perhaps most importantly,
6 if water has to be taken from lakes for the building
7 of snow roads, for example, we could again predict
8 which ones are likely to be less productive for
9 water fowl and therefore might better be used for the
10 building of snow roads than others.

11 Q All right, and you showed
12 us the slide in which there were two lakes, one with a
13 gravel beach and the other one with a marshy shoreline
14 and you indicated that the one with the marshy shoreline
15 would very likely support more water fowl than the one
16 with the gravel beach?

17 A Yes, those are two of
18 the factors involved. There are other factors involved.

19 Q Yes, and it is on the
20 basis of factors like these that you recommend to the
21 Applicant that water should or should not be taken from
22 types of lakes in order to minimize the potential
23 loss of habitat to nesting waterfowl?

24 A Right.

25 Q Now, that is a fairly
26 general --

27 A That applies to the
28 North Slope.

29 Q Yes. That is something
30 that you would say applies particularly to the North

1 Slope and is that on the basis that there isn't that
2 much of that kind of habitat there, or that there is a
3 large number of waterfowl that depend on this area?

10 Q All right. How do these
11 correspond to the lakes that Dr. McCart would be
12 studying for the purpose of seeing whether they are
13 significant to fish population? Are these likely
14 to be lakes that will overlap, or will you and Dr.
15 McCart's interests in different species -- fish as
16 opposed to birds -- lead you two into recommending
17 to the Applicant differently, for different sorts
18 of lakes?

A He will and has doubtless looked at similar lakes and in fact some of the same lakes, in regard to their fish populations and productivity, and no doubt he has similar -- or he has recommendations to make in that regard. It is a matter then of comparing his results with ours, for an overall view, to see if some overall conclusion can be reached on it. The conclusions we reach are with regard to waterfowl. The conclusions Dr. McCarty would reach would be as regard to fish. Now, they may be entirely conflicting, but it is unlikely that they are. However, I don't at this moment,

Banfield, Gunn, Hemstock
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1 know the answer to that.

2 Q All right, so you haven't
3 actually actively consulted with Dr. McCart to see
4 what sorts of characteristics in lakes he would be
5 recommending to the Applicant not to borrow water
6 from or to borrow water from?

7 A That is right.

8 Q And if there is a con-
9 flict in any particular kind of body of water, then
10 someone apart from one of the two of you must make
11 the decision of which species, if you like, to favour.

12 A Well, we have a degree of
13 priority or preference, it is not a "yes" or "no",
14 "black" or "white" response. It is a preferential
15 degree and no doubt he would have the same thing.
16 In the case of conflict I would expect that what you
17 would do would be to choose the optimum result for
18 both disciplines.

19 Q So if your kind of lake
20 was a particular habitat for a species of bird that
21 had no place else to go, or was found in very few other
22 places, then your priority might be very high. His
23 might be high or it might be low because the fish that
24 he was dealing with would be ones that were very
25 numerous and existed in all sorts of other lakes as
26 well?

27 A Right, he has to think
28 about things like whether the lake freezes to the
29 bottom, how shallow it is and so on.

30 Q Yes.

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1 A Between us I think that
2 we can come up with a few lakes.

3 Q All right, and that is the
4 basis of the usefulness of this kind of dialogue between
5 people like yourself and Dr. McCart --

6 A Right --

7 Q -- that at some point
8 you will come across a lake that neither of you considers
9 to be significant and you will tell the Applicant, "Well,
10 you can at least take water from that one."

11 A Right.

12 Q At the other end of the
13 scale there may be one where there may be more than
14 one class of lakes in which you are in dispute, in which
15 you will say, "There is no problem with birds, they
16 don't use that kind of lake in large numbers", but
17 Dr. McCart --

18 A But they are important
19 to fish --

20 Q They are very important
21 to fish --

22 A Right.

23 WITNESS MCCART: May I inter-
24 ject here? Dr. Gunn is obviously worried about
25 situations where the draw down will not be replenished
26 by the spring runoff and I don't think that there are
27 too many situations where we will want to be taking a
28 sufficient volume of water from a lake that it will not
29 be replenished by the spring runoff, the subsequent
30 spring, and therefore, I don't think that in most

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1 instances, and if we thought that the situation might
2 arise where it might not be replenished, I don't think
3 in most instances we would take water from an area
4 which has such a tiny area feeding it, that it might not
5 be replenished --

6 Q When you say that, I take
7 it what you really mean is that you wouldn't be recom-
8 mending that to the Applicant?

9 A No.

10 Q And Dr. Gunn, is that
11 your basic concern, or are there times when water might
12 be taken for early camp use at the time when gravel
13 was being mined, for example, and water was required
14 for the camps, that you would be worried about dis-
15 turbance of staging birds and not just the replenishment
16 problem?

17 WITNESS GUNN: Yes, that
18 is one of our concerns.

19 Q All right, so that adds
20 a dimension to the kind of concern that Dr. McCart has
21 stated, you have an additional one that deals with
22 a specific time of year or perhaps more than one time
23 of year?

24 A Right.

25 Q And again, is this some-
26 thing that you have had the opportunity to discuss with
27 Dr. McCart, or do you just make your submissions to the
28 Applicant and he must weigh them in the absence of your
29 discussing them with Dr. McCart?

30 A We have discussed it in

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McCart, Jakimchuk
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1 general terms, Dr. McCart and I, but it seems to me and
2 perhaps to Dr. McCart, I should let him speak for him-
3 self, that the time to consider this is when the
4 engineers are considering what lakes to use. We would
5 then give specific consideration to the specific
6 lakes that they are contemplating using.

7 Q Now, one of the phrases
8 that has been used by this panel and by the lawyers
9 examining this panel is the predictions of impacts and
10 it is a phrase that I would like you, perhaps, to discuss
11 and define for us in terms of the things that you
12 feel you should know before being able to predict an
13 impact, and if you would like to take the example of a
14 particular species, please do so, but we got to the
15 stage, before we digressed on to lakes, of saying that
16 base line data gives you a platform from which to
17 go, What else do you need to know before you can
18 satisfactorily to yourself, predict an impact and pass that
19 information on to the Applicant?

20 MR. MARSHALL: Well, sir, this
21 is, I am sure, very interesting, but this is what
22 has been testified to by Dr. Gunn. Surely the whole
23 basis of all his work is the prediction of impacts and
24 the mitigative measures. He has addressed that at
25 very great length. Should we be going back through
26 what is already in the record and in the application,
27 again and does this help us?

28 MR. BAYLY: Mr. Commissioner,
29 when we started this panel we were given a fresh piece
30 of evidence from Dr. Banfield, on the philosophy used

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McCart, Jakimchuk
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1 by this Applicant in order to produce an environmental
2 impact statement. We were given this at a late date
3 because the Applicant felt it was required.

4 Now, I would like to go through
5 that kind of method with each one of these gentlemen
6 to see what they used as their basis for predicting
7 impacts for the Applicant, to see if it measures up
8 to that statement that was made by Dr. Banfield, and if
9 it does, fine. But, Mr. Marshall, I would submit,
10 should not be telling me that I should not discuss
11 the philosophy of this thing when he felt, through
12 his witness, that he should present fresh evidence
13 at a late time on this specific topic.

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1 MR. MARSHALL: I have now got
2 an idea where Mr. Bayly is heading, and I appreciate
3 your assistance, Mr. Bayly.

4 MR. BAYLY: You're welcome,
5 Mr. Marshall.

6 Q Is my question clear ,
7 Dr. Gunn?

8 WITNESS GUNN: Yes, I think so.
9 The baseline studies, taken over a period of time, give
10 us an idea of the kinds of birds that are present and
11 the densities at a given season in a given year, and
12 we accumulate that for two or three years or more, We
13 begin to get a fairly clear idea of the natural
14 ranges in populations that we are likely to expect in
15 a given habitat. So that we have some idea of the
16 natural variation from one year to another. Then we
17 have to consider what types of impact are likely to
18 arise from construction and operation of a pipeline,
19 and using that information, we have to devise, as well
20 as we can, experiments that are likely to simulate
21 that impact on bird populations. to see what effect
22 that has, and whether the effect is likely to be more
23 or less than one would normally expect from year to
24 year . This is the kind of information we endeavored
25 to put together together with what we can find in the
26 literature, to enable us to come to a conclusion on the
27 probable impact of the construction and operation of
28 a pipeline on a given species in a given area at a
29 given time.

30 Q And do you feel that

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1 the studies that you have done and the amount of time
2 that you have been able to spend, for example, on the
3 North Slope has given you the information that you need
4 to define those experiments that should be conducted ,
5 to conduct the experiments, and to predict for the
6 applicant and for this hearing, those impacts which are
7 likely to occur to the various species of birds?

8 A I would like to divide
9 the impacts into long-term and short-term impacts.
10 I think that we have covered the short-term aspects of
11 it pretty well and can give a reasonable statement on
12 that. The long-term impacts are -- present a much more
13 difficult problem in designing experimental attack,
14 because per se, you have to undertake the program over
15 a long period of time. There's really no way of teles-
16 coping the impact to give you a result, the long-term
17 results over a short period of time. So when it comes
18 to long-term impacts, we have to use the information we
19 have at hand and our judgment on what that is likely
20 to be over the long term.

21 Q And when you say "the
22 long term" I take it you must take into account not
23 only the fact that this applicant is applying for a
24 right-of-way for a gas pipeline, but that this may
25 develop the corridor for an oil pipeline and may lead
26 to greater and more intensified exploration for gas
27 and oil, and perhaps even other things, in the area
28 adjacent to the right-of-way which would be opened up
29 by this applicant.

30 A That makes it almost open-

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1 ended. Our studies have been limited largely to the
2 effects of the proposed gas pipeline. Now we have looked
3 at other things but we haven't done detailed studies
4 as to the cumulative or long-term effects of other
5 modes of transportation in conjunction with an Arctic
6 Gas Pipeline.

7 Q All right. So you have,
8 because of the problems of, in fact all sorts of
9 unpredictable things, could go into the corridor that
10 are beyond the control of this applicant, that you had
11 to confine your long-term assessment, which as you say
12 is more difficult than a short-term one, that any long-
13 term assessment you did would have to be confined to
14 this particular project.

15 A We felt it reasonable
16 to do so in view of the difficulty of getting any
17 hard facts about any other developments.

18 Q Yes. But the long-term
19 effects that may well exceed the life of this facility,
20 I assume, even if it turns out to be the only facility
21 to use, say, the North Slope of the Yukon.

22 A That's true.

23 Q And these are things
24 that are either difficult or impossible to predict as
25 they relate to birds at this stage.

26 A Difficult but not impos-
27 sible.

28 Q Yes. Now, the next
29 step is to determine, after the steps that we have first
30 identified, that is to find out what birds are there,

Banfield, Gunn, Hemstock
McCart, Jakimchuk
Cross-Exam by Bayly

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and to study their habits for a period of years as long as you've got, I assume, you keep studying them, in other words you're still at it. But you have to determine at some point what experiments to do and you have outlined in your evidence two studies and both have to do with disturbance. One is disturbance by aircraft, fixed wing and helicopter, and the other is a disturbance by a simulator compressor station noise.

They are referred to on
page 32 of your evidence.

A Those are two of our studies, but they are not the only studies.

Q Yes. But as we're dealing with experiments on the North Slope, were there other actual experiments with bird populations, apart from those two?

A Yes, we did disturbance in relation to human presence.

Q That's the one on the Firth River?

A Yes.

Q Yes. Let's refer to the first two experiments. Let's start with the compressor station noise simulated.

A Right.

Q Now, can you tell me first of all what are the senses that are the most acute for birds? What do they cue on when they're being

Banfield, Gunn, Hemstock
McCart, Jakimchuk
Cross-Exam by Bayly

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disturbed first, is it hearing or is sight, or smell?

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A I would think that would vary with the species, but the two most acute senses are hearing and sight.

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Q All right.

A Not smell.

Q And in your experience

with the one population that you have that was statistically large enough to give you a certain kind of result, the Lapland longspur, what do they cue on first, sight or sound?

A Well, in this particular

experiment, if you are referring to the one done at Babbage River, on the populations of birds there, where we had a fair number of Lapland longspurs nesting, the results that we obtained showed no statistical difference in the success, breeding success of the longspurs on the test plots and on the control plots. I don't feel we have any data to indicate whether sight or sound is more important to them on that experiment certainly

Q All right, now this was an experiment^{to}/simulate a particular aspect of a compressor station, I take it. That is the sound of it.

A Right.

Q The men who were conducting the experiment had secreted themselves in blinds, is that correct?

A No, they periodically

Banfield, Gunn, Hemstock
McCart, Jakimchuk
Cross-Exam by Bayly

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ran transects through the plots to measure the bird
populations and measure the nesting success.

4

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Q All right, and was that
during the time that the noise was on?

6

A Yes.

7

8

Q And was the noise left on
for a long period of time?

9

A Yes.

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Q And I gather there are
other things about compressor stations that might be
significant to birds, perhaps not necessarily to the
Lapland longspur. A compressor station does not look
like a simulator, would you agree with me there?

15

A Right, right.

16

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Q And the compressor
station has associated with it certain things that
may not have been associated with this simulator --
movement of people.

20

21

A There was some movement
of people here but it would not be in the same order.

22

Q Movement of vehicles.

23

A Right.

24

Q Movement of aircraft.

25

26

A What we were testing
here essentially was the effect of the sound.

27

28

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Q Yes. Now, as this compres-
sor station simulator related to the movements of
staging geese --

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A Right.

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McCart, Jakimchuk
Cross-Exam by Bayly

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Q -- we have also this same limitation on it but it doesn't look like a compressor station and it doesn't have some of the related activities, is that correct?

A Correct.

Q And those are limitations on the experiments.

A Yes.

Q Now was this experiment designed with birds in mind, or was it really designed for the caribou and used by the bird study?

A I don't know that either of those is true.

Q I don't either, I'm just asking you.

A Perhaps Mr. Hemstock could clarify that, but I don't think it was designed primarily for either one, and just happened to be used for the other. It was designed to reproduce the various sounds of a compressor station in a realistic way for experimentation in the field. It wasn't designed specifically for birds or for caribou.

Banfield, Hemstock, McCart
Gunn, Jakimchuk
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1 Q All right, I notice in
2 Dr. Banfield's addendum to his evidence that he refers
3 to being responsible for having part of the decision
4 anyway in the use of this experiment and then perhaps
5 you could help us, Dr. Banfield and tell us what that
6 experiment was designed for?

7 WITNESS BANFIELD: Yes, I
8 think that perhaps I should contribute at this point.
9 As far as I recall, I feel quite sure that I had the
10 initial input in it, when I visited a compressor station
11 in southwestern Alberta and heard the sound which was
12 quite trying on human ears, but observed that there
13 were mule deer in close proximity and there were beaver
14 working on a pond about 100 yards from the compressor
15 station and there were birds singing that I couldn't
16 hear, and I came back from this and discussed it
17 with Mr. Dau and suggested that we didn't really know
18 how such a sound might affect northern species and
19 he asked me to give it more thought and to consult with
20 Dr. Gunn.

21 The point here is that Dr.
22 Gunn, as you know, is an expert in sound recording and
23 he played an important part in the development of the
24 system initially and we had to turn it over to other
25 electronics experts, but in some of our preliminary
26 meetings, Dr. Gunn also very quickly saw the necessity
27 to investigate this and I remember Mr. Dau asking Dr.
28 Gunn to do some thinking about the technical possibilities.
29 I think it was -- I don't think either caribou or
30 geese were singled out one before the other. It was

1 really the identification of a concern.

2 Q If I can go back to
3 you, Dr. Gunn, the thing that I would like you to address
4 yourself to is do you feel that this experiment by
5 itself enabled you to predict the impact of compressor
6 stations and their related noise, or only the noise?

7 WITNESS GUNN: To answer
8 that, I think that I should give you my opinion and
9 experience, that inanimate objects, such as a compressor
10 station or a building are unlikely to have any marked
11 impact on bird populations. That leaves human presence
12 and we are very interested in that, so personally I am
13 prepared to discount the effect of inanimate objects,
14 but I wasn't prepared to discount the effect of sound
15 or of human presence.

16 Q All right, so sound and
17 human presence together may create, on a compressor
18 station site, certain effects that you can hypothesize
19 about but can't say for certain from the experiment
20 that you conducted?

21 MR. MARSHALL: Is that a
22 question?

23 MR. BAYLY: Yes, question
24 mark.

25 A I think that that is a
26 fair statement.

27 Q Now, geese, for example,
28 if you want them to land near you, snow geese, you try
29 and hide yourself and perhaps put out decoys as you did
30 in your experiment in order to lure them close to the

1 area so they think there are geese there and they
2 feel comforted by that, is that -- that is the reason for
3 putting up the decoys that you did in your experiment?

4 A That was the reason
5 we put them out and I think it was 1972, for that
6 experiment, but then we weren't sure about the effect
7 of the decoys and we felt it was possible that the
8 decoys might even be frightening them away. Our
9 decoys weren't all that wonderful in terms of reproduc-
10 ting the goose.

11 Q Yes.

12 A So the following year
13 we ran a similar experiment for a longer period of
14 time without the decoys.

15 Q And were the results
16 significantly different, or were --

17 A The results in the
18 second experiment indicated that -- well, I should say
19 in the first experiment it showed that geese didn't
20 come within about a mile and a half of the sound when
21 it was turned on and there were other effects related
22 to it, but the basic, perhaps the most important one
23 was that they wouldn't feed within a mile and a
24 half of the sound.

25 Q Yes.

26 A In the second experiment,
27 and in the first experiment, the sound which was par-
28 tially directional, was faced in the direction of
29 approach of the geese. In the second experiment, the
30 simulators were set up so that the sound was moving

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1 at right angles across the path of the geese and in this
2 experiment, which was conducted over a considerably
3 longer time, the geese eventually came to feed within
4 about a half a mile on the noisy side of the simulators.
5 In the first experiment, birds in flight were diverted
6 by as much as 90 degrees, in the second case only
7 about 45 degrees.

8 Q All right, so would
9 you be satisfied with the analysis of your experiments
10 that compressor station noise by itself may cause a loss
11 of feeding grounds for staging geese which might have
12 a maximum radius of approximately one and a half miles?

13 A I think it might be as much
14 as two and a half miles for a full compressor of the
15 power now proposed. I think that it is possible that
16 the geese may not feed within two and a half miles of
17 such a compressor station.

18 Q Now, if we combine that
19 with human presence, not only at the compressor station,
20 but for example, in the construction year bringing
21 supplies to places like Komakuk Beach, to mining
22 gravel from the active flood plains of braided stream
23 rivers, of survey crews on the line, of helicopters
24 and fixed wing aircraft being used for various purposes,
25 shuttling people back and forth, shuttling whatever
26 else they have to take from site to site. Is it possible
27 to predict the effect of a number of these things
28 together?

29 A In our opinion, if that
30 were uncontrolled, the impact might be considerable, so

1 we have recommended that these activities be sharply
2 curtailed during the period of time when the snow
3 geese are on the North Slope.

4 Q All right, now the times
5 that you are talking about, and let's take the fall
6 staging time, for example, that is getting close to the
7 end of the shipping season, isn't that correct?

8 A Yes, it is.

9 Q All right, and just
10 take for example that certain supplies would have
11 to come in around Alaska and Point Barrow and into
12 the Beaufort Sea and be dropped off, say, at Komakuk
13 Beach.

14 A Correct. --

15 Q And you are getting
16 close to the end of the shipping season --

17 A Yes --

18 Q And what you are saying
19 is that if the geese are staging, you are recommending
20 to the Applicant that the barge not come into that
21 area, or the ship not come into that area during a
22 certain period of time which is critical to the
23 snow geese?

24 A No. No, the geese are
25 not, the snow geese are not directly along the shore,
26 so that activity on the staging site, or in terms of
27 barges or boat traffic approaching the staging site,
28 would not, in our opinion, constitute a major disturbance
29 to geese.

30 Other activities, such as you

1 mentioned would have.

2 Q Yes, but you are concerned
3 with boat activities with regard to other species
4 of birds, is that correct?

5 A At certain seasons,
6 yes.

7 Q And you have made
8 recommendations about these?

9 A We have, yes.

10 Q And you have in your
11 recommendations, and I am referring to these, the
12 "Summary of Ornithological Recommendations in Regard
13 to the Proposed Gas Pipeline Route," March 1975 at
14 page 12, you're concerned at that page and have
15 made recommendations with regard to boats, ships and
16 barges. Do you have that in front of you, sir?

17 A I think I can find it.
18 Thanks very much. All right. I have it now.

19 Q Now, you said that to
20 minimize disturbance to molting waterfowl you recommend
21 that barges and other boat traffic into and out of
22 Camden Bay be directed on a course at right angles
23 to the shoreline and that barges and other boat traffic
24 be restricted from entering Simpson Cove and that human
25 activities should not be allowed on or over the spit and
26 that final selection of the wharf site should not
27 proceed until the results of the 1975 field study are
28 available --

29 A Right.

30 Q So those are very specific

1 recommendations with regard to boat --

2 A Yes.

3 Q Yes. Now, I gather you
4 give these recommendations to Mr. Hemstock, is that
5 correct?

6 A Correct.

7 Q And Mr. Hemstock with
8 that recommendation, what have you done?

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Banfield, Gunn, Hemstock
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Cross-Exam by Bayly

1 WITNESS HEMSTOCK: Apparently
2 looking at all of ~~te~~ staging sites proposed for the
3 Beaufort Sea coast on a much more site specific basis,
4 and it's simply a matter of taking these recommendations
5 and others that may come from say Dr. McCart, Mr.
6 Jakimchuk, and checking the timing that we expect to
7 be there, what we expect to have to do, and what
8 mitigative measures we can come up with and selecting
9 the final location.

10 Q All right.

11 A These are site specific
12 works that have to go on.

13 Q All right, but you have
14 to evaluate these recommendations, I assume, before
15 that.

16 A Yes.

17 Q Let's take this recommen-
18 dation, and I think it's probably a very good one, but
19 let's take it on a practical basis, and you've got a
20 ship's captain and you are contemplating telling him
21 that he has to come in at right angles into Camden
22 Bay to minimize the disturbance on moulting waterfowl.
23 Is that something that you would feel could be policed?
24 Would you send him out to try again if he comes in at
25 an angle of 30 degrees, or --

26 A No, I think what you have
27 to do there is outline the areas, and Dr. Gunn can
28 do this for us, that he finds are most critical on the
29 bars and spits around there, and then prepare that sort
30 of a guideline for the bargemaster that will be bringing

Banfield, Gunn, Hemstock
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1 the supplies in.

2 Q We ran into this same
3 kind of problem, I think, when we discussed with Mr.
4 Dau and others at what height you can fly aircraft, and
5 to what extent the applicant can police this sort of thing
6 when it's dealing with independent contractors who have
7 been asked to transport materials back and forth, or
8 when you're dealing with, say in this example, of a storm
9 situation where the man comes in the best way he can
10 and it may not be very satisfactory.

11 A Certainly when it comes to
12 safety of personnel with regard to flying or this kind
13 of thing, that overrides all other considerations, in
14 our opinion.

15 Q All right, and if you
16 had a bad storm like we did in 1970 and the ice came
17 -- broke away from the pack and moved in close to the
18 Beaufort Sea shore and a barge had to pick its way in --

19 MR. MARSHALL: Are you going
20 to lead some evidence about this, Mr. Bayly?

21 MR. BAYLY: I am, Mr. Commis-
22 sioner.

23 MR. MARSHALL: It's not in
24 evidence now.

25 MR. BAYLY: Mr. Commissioner,
26 we went through this before. There's a --

27 MR. MARSHALL: If you want to
28 ask the witness whether he agrees with that, so as to
29 form the basis of a question, I don't have any object-
30 ion, but when you in the process of asking questions

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Cross-Exam by Bayly

1 put materials into evidence, I think I have to object.

2 MR. BAYLY: Mr. Commissioner,
3 if I may, the sequence of calling of evidence --

4 THE COMMISSIONER: I thought
5 Dr. Gunn was going to say something.

6 MR. BAYLY: He may have heard
7 of this storm.

8 WITNESS GUNN: That's right,
9 Mr. Commissioner. I was going to say I thought I could
10 resolve this by saying that in the event of such a
11 storm birds would move to a sheltered area and the
12 problem probably would not arise.

13 MR. MARSHALL: All right.

14 MR. BAYLY: I hope Mr. Mar-
15 shall is not expecting me to move to a sheltered area
16 for the rest of the hearing.

17 Q Now, that may not be a
18 problem then, but we are faced, I submit to you, with
19 unpredictable things that will make it difficult to
20 follow a specific recommendation like that, and somebody
21 like Mr. Hemstock -- and Mr. Hemstock, you may wish to
22 comment on this -- has to evaluate these in terms
23 of what can you get people to do. Is that not fair to
24 say, sir?

25 WITNESS HEMSTOCK: I think
26 that's right, yes.

27 Q Now, we have another
28 recommendation here with regard to a particular dock
29 and wharf site being put in the north-east corner and
30 as far from Demarcation Bay as possible. Is that --

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1 does that impress you, Mr. Hemstock, as a recommendation
2 which is going to be difficult to carry out?

3 A I don't recall that there
4 was any difficult here, although we are looking at
5 an alternative to Demarcation Bay as well as another
6 site that might be used.

7 Q That may be the result of
8 this recommendation that in order to avoid the problem
9 that Dr. Gunn has foreseen that you would get out of
10 that area entirely for the purpose of having a wharf
11 site.

12 A Yes, a general recommen-
13 dation, where there has been a disturbance already
14 that we would be expected to go into that area if we
15 could.

16 Q All right, and again we
17 have another recommendation that at Komakuk we recommend
18 that all boat traffic avoid Ptarmigan Bay. Now as
19 I recall my discussion with Mr. Williams, fairly
20 recently, is that Komakuk Beach would still be a
21 staging area. Can that be a staging area and still
22 avoid Ptarmigan Bay?

23 WITNESS GUNN: Yes, it can.
24 Ptarmigan Bay is some distance to the east and there's
25 no reason that traffic should go in there, if it's
26 properly controlled.

27 Q This is the way of your
28 flagging an area which is not designated for use yet
29 but just in order to tell the applicant they should
30 avoid using it if at all possible.

Banfield, Gunn, Hemstock
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Cross-Exam by Bayly

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A Yes.

3

Q Similarly with the Shingle

4

Point, there's a recommendation that boat traffic stay

5

well clear of Escape Reef. Now is that a site where

6

we may be --

7

A For the safety of the boats

8

it's better to stay clear of the reef, but actually it's

9

Barrier Reef off there that birds use at some times of

10

the year. It's more of a menace to navigation than it

11

is to anything else, and I would expect that shipping

12

or barges would take every reasonable step to stay

13

away from it, in any case.

14

Q Now, with regard to the

15

next recommendation, you say,

16

"As mentioned under aircraft, all stockpile

17

staging sites along the North Coast should be

18

self-contained and not require aircraft supply."

19

Now I would assume, Mr. Hemstock, that this one gives

20

a great deal of difficulty, in that you may find that

21

there is, in your construction year a strike at some

22

point in the dockworker business and you may not be

23

able to get the ships loaded and you may have to bring

24

stuff in by airplane. Or not use that site.

25

WITNESS HEMSTOCK: No, we would

26

expect to have to move people in and out of these

27

sites by air.

28

Q This particular recommen-

29

dation doesn't talk about people, it talks about the

30

stockpiling, as I read it, and perhaps Dr. Gunn can

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1
2 correct me if I'm wrong, he doesn't want pipe and
3 fittings and equipment coming in by air, he wants to
4 make sure that that all comes in by sea along the
5 North Slope of the Yukon. Is that correct, Dr. Gunn?

6 WITNESS GUNN: Yes, we under-
7 stand that these people will be brought in and out
8 largely by air, but the equipment and more particularly
9 the supplies for these people, we would like to see
10 either brought in by ship or brought in by air during
11 the winter, but not during the summer.

12 Q You would appreciate
13 that if there were a dockworkers' strike and that made
14 it difficult to get ships loaded, that the applicant
15 would be faced with a very difficult problem, following
16 this recommendation.

17 WITNESS HEMSTOCK: I'm afraid
18 that the amount of freight we require, the aircraft
19 wouldn't do us much good.

20 Q So you would be faced
21 with the possibility of having to delay it for a season.

22 A That's correct.

23 Q All right, but if you were
24 part-ways through your season or if some of your supplies
25 were coming from a certain point where there were this
26 kind of trouble, or where you couldn't get your boat
27 past Point Barrow because of ice conditions --

28 WITNESS GUNN:

29 A We would have to look
30 at that, I think, at the time and another way out of
it is to route the aircraft out to sea and bring them

Banfield, Gunn, Hemstock
McCart, Jakimchuk
Cross-Exam by Bayly

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back in again, rather than flying along the coast.

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Q Now, I realize I'm raising

a lot of hypotheticals, Mr. Commissioner, and I can

see Mr. Marshall squirming in his chair because of it,

but all I'm trying to suggest, Dr. Gunn, is that there

are a lot of things that cannot be predicted, despite

the specificity of your recommendations. They may

require on-the-spot decisions, contingency plans, etc.

Would you agree with that in a project like this?

A I think that we are

being more specific and proving our recommendations

as we go along all the time, and that this will continue

to happen right up to the time of construction and

during construction.

Q But you don't feel in a

position now to be able to predict whether or not all

these recommendations can be even physically obeyed

at all times.

A I think at the present

time we can and have put down a reasonable set of

recommendations, knowing that it may not be possible

100% of the time to live up to all of them, but this

is what we would like to see.

Q Now, if we can go back

to the basis on which you did these studies, Dr. Gunn,

it appears that you did studies at a different level

on the coastal and on the interior routes.

A Where does that appear?

Banfield, Gunn, Hemstock
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1 Q It is here on page 32

2 in the second full paragraph you said,

3 "Along the North Slope I worked geographically
4 and encompassed the proposed route from Prudhoe
5 Bay across North-eastern Alaska and across North-
6 western Yukon to the Mackenzie River Delta. We
7 also reviewed the route through the Brooks
8 Mountain Range and across the Richardson Mountains
9 to the Mackenzie River."

10 Now, maybe I'm reading it wrong, Dr. Gunn, but it appears
11 you spent most of your efforts working on the North
12 Slope, and I assume that's because it's the prime route
13 chosen by the applicant. Would that be fair to say?

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Gunn, Hemstock, McCart,
Jakimchuk, Banfield
Cross-Exam by Bayly

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A No.

2

Q So you have studied them

3

both equally?

4

A We were careful to make
to have a number of survey sites along the proposed
route through the Brooks Range and I think that that is
very comparable to the number we had on the, what became
the Prime Route on the North Slope. In addition to that
we had some on the right on the coast. So that, in our
view, our based line studies gave us a very even and
full look at both those routes.

5

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Q Right. Now, if we
isolate this to purely bird consideration, and at the
moment excluding Alaska and the Canning River, which I
understand is a difficulty for everybody. Is there in
the two Canadian routes, the Prime and the Interior
alternate a preferred route for concerns about birds?

13

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A It remains the same as
far as we are concerned. We prefer the Interior Route
for birds.

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Q Right. Now, if we add
the Canning River into the mix, because I understand
that evidence has come out that the environmental
consultants from all the disciplines wanted to avoid
paralleling the Canning River to any significant
distance. Does that change your priorities for the
Interior as opposed to the Coastal Route, starting from
Prudhoe Bay this time and not just considering the
Canadian portions of the Route?

Gurn, Jakimchuk, Hemstock,
 McCart, Banfield
 Cross-Exam by Bayly

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A No. We have given our reasons -- our reasoning on it. We realize that the Canning River presents problems and we have looked at it purely from an ornithological point of view and the nesting sites of raptors along the Upper Canning are, present a considerable problem, but they do not change our viewpoint on our preference of route.

Q Okay. Now, an interesting discussion was had on March 14 and is found in the Volume 18 of the transcript between Mr. Scott and Mr. Dau. Mr. Dau gave evidence that there were difficult decisions that had to be made on the actual location of the Prime Route, in that the ornithological consultants preferred that as far back from the coast as possible, and the mammologists and particularly the people with concerns for caribou wanted it to stay out of the foothills of the mountains as much as possible. Do you recall that being an area where you and Mr. Jakimchuk and others had disagreements?

A I have never had a disagreement with Mr. Jakimchuk on any of these things. We have our opinions as to what we prefer but we can see the other person's viewpoint. In this particular case, early in our studies we were concerned about the Coastal Route and still are. For that reason, we suggested that the line should be as far south as possible on the North Slope. Since that time, however, we have learned of the presence of raptor nesting sites along the foothills and it seems that in it would now be

Gunn, Jakimchuk, Hemstock
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1 a little better in our viewpoint if the route were say
2 a mile or two farther north.

3
4 Q Farther north than it is
5 now proposed?

6 A Yes.

7 Q All right. Now, would it
8 be too strongly put then by Mr. Dau at page 2101 of the
9 transcript, where he was asked by Mr. Scott, starting at
10 line 6:

11 "And I take it in this almost impossible
12 example on the North Shore in the end
13 both the caribou people and the bird people
14 were furious at the result.

15 A I think that might be too strong, sir.

16 Q Were very upset.

17 A Yes, that is probably true."

18 Now, would that --

19 A No, I am sorry, I could
20 not agree with that. I can see Mr. Jakimchuk's viewpoint,
21 in considering the Interior Route versus the Coastal
22 Route. I see it quite clearly Dr. McCart's problems
23 with the Interior Route or Mr. Jakimchuk and I both have
24 situations where there are things to be said on either
25 side. But I have never been furious at him and I do
26 not think he has been furious at me. But he can speak
27 for himself on it.

28 Q But I understand that
29 everybody was furious with Mr. Dau on it.

30 A No, I do not think that

Gunn, Jakimchuk, Hemstock
McCart, Banfield
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1 was the case either.

2 MR. MARSHALL: He is just very
3 sensitive.

4 WITNESS JAKIMCHUK: Absolutely
5 not.

6 Q All right, so that is
7 putting it too strongly but there were places where
8 compromises were made as I understand from Mr. Dau's
9 evidence that did not suit any particular environmental
10 interest completely, but were made in order to find some
11 ground that would do as little damage as Mr. Dau could
12 imagine, to the various species in which all the
13 environmental consultants were interested.

14 WITNESS GUNN: A I think
15 in the particular case you mention, that is one of the
16 placing of the route on the North Slope was eventually
17 decided, accepted that where it was was probably as good
18 as could be obtained. And that all parties were
19 reasonably satisfied, with the exception of ourselves
20 and we feel that perhaps it should be a little farther
21 north than it is, in places.

22 Q Now, do you set down then
23 that some point with a red pencil or whatever and go
24 over the alignment sheets with a new proposal based on
25 your recommendation?

26 A We have -- in this
27 particular instance -- we have reported the situation
28 quite recently to Arctic Gas and they are now considering
29 what measures could be taken to adjust that.

30

Gunn, Jakimchuk, Hemstock
McCart, Banfield
Cross-Exam by Bayly

1
2 Q All right and Mr. Hemstock
3 maybe you can answer this, do you end up with various
4 lines drawn on the alignment sheet as new recommendations
5 come in from month to month? I don't mean that the
6 Applicant necessarily responds to these because they
7 may be competing but that the Applicant has an idea at
8 all times of the various new alignments recommended by
9 its various consultants.

10 WITNESS HEMSTOCK: A Yes,
11 I suppose you could call it that. We have the
12 recommendations from Dr. Gunn which he has just mentioned
13 and which suggest that the line be better about a mile
14 perhaps further north than it is. And we are looking
15 at that now, but as you can imagine requires checking
16 with the other people interested, Dr. McCart and Dr.
17 Jakimchuk. Such things as borrow locations and river
18 and stream crossings, but that is basically what we do.
19 We draw another line on there would suit Dr. Gunn better
20 and review it and see how it -- how we can meet his
21 requirements.

22 Q All right. Now, when you
23 say that is basically what you do. Do you actually do
24 that or does everybody sit down at the equivalent of
25 another April, 1973 meeting and discuss these things and
26 as a result of that, a new line or no new line is
27 drawn.

28 A Well, in this particular
29 case, we were all sitting around the table when these
30 maps were brought out and we will be just looking at that

Gunn, Jakimchuk, Hemstock
McCart, Banfield
Cross-Exam by Bayly

1 situation.

2 Q All right so you are due
3 for another one of these, I assume, at some point prior
4 to final design?

5 MR. MARSHALL: Another what?

6 MR. BAYLY: Another of these
7 kinds of meetings where you sit down and discuss the
8 recommendations that have come in lately.

9 A No, I think this is now
10 a more a continuing type situation where we are reviewing
11 these things as they come in, not waiting for any
12 specific meeting and they are now, I think, more
13 isolated, that they are with relatively small parts of
14 the line that we are looking at. There are more
15 site specific.

16 Q All right. Now, Dr.
17 Gunn, the concern of L.G.L. goes back to that April,
18 1973 meeting as I understand or before?

19 WITNESS GUNN: A Before.

20 Q Yes. And I have the
21 transcripts here of that meeting of April 13, 1973 and
22 I will read a statement from page 47 that Mr. Livingstone
23 made and perhaps you could tell me whether this is the
24 reflection of L.G.L. as a consultant to Arctic Gas even
25 after now, two years more study.

26 "I think that all I need
27 to say at this time is that on the basis of ornithological
28 habits, habitats both empirical and experimental we are
29 categorically opposed to a Coastal Route. An Interior
30 Route has very few bird repercussions and potentially

Gunn, Jakimchuk, Hemstock
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1 a few sites of the species and I know that we can make
2 the necessary arrangements to handle that one both
3 seasonally and specially."

4 A We will continue to look
5 at that and in my prepared evidence I said that, although
6 I prefer -- I am speaking now for L.G.L. -- we prefer
7 the Interior Route. We believe that the route could be
8 built along the Coastal Route -- the Prime Route, without
9 major damage to bird populations provided our recommenda-
10 tions are carried out.

11 Q Right. And that is the
12 reason -- that is the difficult problem that we identi-
13 fied with Dr. McCart, of the ability not only of the
14 Applicant but of everybody related to the project
15 being able to carry out the various recommendations?

16 A Right.

1 Q If we can perhaps discuss
2 in terms of the North Slope endangered species. Now,
3 perhaps you could give us a definition, as you under-
4 stand it, of that term so that we do not use it
5 loosely. I think "rare" and "endangered" are often used
6 together. Are there differences, or is this a phrase
7 that refers to specific species and numbers and habitats?

8 A They are not synonymous.
9 A bird can be rare without being endangered, and a bird
10 can be fairly numerous and be endangered through some
11 special circumstance. The phrase, "rare and endangered"
12 has been -- has come into use to describe certain
13 birds that are not only few in number, but because
14 of some environmental occurrence, which may or may not
15 be known, their numbers have dropped in significant
16 fashion in recent times and for that reason they are
17 endangered, and one person's definition of it is about
18 as good as another person's. Dr. Banfield might have
19 one. I have here a paper by Earl Godfrey of the National
20 Museum who wrote a paper in the "Canadian Field Natural-
21 ist" on Canada's endangered birds.

22 I was speaking recently to
23 somebody in Canadian Wildlife Service who was strongly
24 interested in raptors who said that he didn't like
25 the use of the word "endangered" at all, really, that
26 he would rather use the word, "sensitive", because
27 they are extremely sensitive to disturbance.

28 Q All right, now I gather
29 we can be satisfied then with a general definition, that
30 a species can be rare and endangered, first of all, if

1 it's subject to disturbance very easily; secondly, if its
2 habitat is threatened by something; and thirdly, if
3 its numbers are small, and none of those things by
4 themselves may be enough, but a combination of more
5 than one of those may be enough to put it into this
6 category, is that fair to say?

7 A I think that is fair
8 enough.

9 Q Now, one of the things
10 that was said, again by Livingston in this meeting of
11 April 13, 1973, at page 44, is as follows, starting
12 approximately at the middle of the page, and these
13 pages are not numbered by lines:

14 "The problem, however, is, and always
15 will be, that what is identified as rare
16 or endangered at this point in time, but
17 some species that are relatively numerous
18 now are going to feel the impact and they
19 are going to feel it hard, depending
20 upon the area, depending upon the habitat,
21 depending upon the season. So I have to
22 predict that we will have more endangered
23 species on the list by the time this operation
24 is underway than we now have."

25 And is that an opinion that you share?

26 A By the time this operation
27 is underway?

28 Q Yes.

29 A That would presumably
30 be the beginning of construction of the pipeline?

1 Q I am assuming that from
2 the phrase that he used, "underway."

3 A The meat of the statement
4 seems to be that there would be more species in the
5 category of rare and endangered, say, four years from
6 now than there were a year ago.

7 Q Yes.

8 A Well, it is an opinion,
9 I don't know that L.G.L. has expressed an official
10 opinion on that. Certainly world wide there will be.
11 Whether there will be in the particular area of the
12 pipeline is open to question, I would say.

13 THE COMMISSIONER: It seemed
14 to me that Mr. Livingston might have meant, not at the
15 time the pipeline constuction gets underway, but when it
16 is completed and the running of gas through it gets
17 underway. I don't know what he meant, but would that
18 alter your answer, Dr. Gunn?

19 A I am trying to think,
20 Mr. Commissioner, of any species that might come in,
21 qualify as rare and endangered as a result of the impact
22 of the pipeline. I can't think of any at the moment.

23 MR. BAYLY: All right, Dr.
24 Gunn, let's take as an example, the snow geese. Now,
25 in terms of numbers at the present time, the snow
26 geese that frequent the North Slope and the Delta area
27 for their staging, you have suggested were in numbers
28 of approximately 300,000 or more, is that correct?

29 A Right.

30 Q Now, they use some very

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Cross-Exam by Bayly

1 specific areas for their staging, it is a localized
2 area, not a vast area, for their staging from the
3 time that they start to move south, is that correct?

4 A It is more than local,
5 it is fairly extensive.

6 Q I don't mean local in
7 terms of a few acres, but in Canada, for example, we
8 can say that it is along the North Slope and in the
9 Delta, and to a certain extent in the Tuk Peninsula
10 and the Anderson River.

11 MR. MARSHALL: Surely that
12 is not local, Mr. Bayly.

13 MR. BAYLY: Is that correct?

14 A In stating that you
15 must take into consideration that this is a population
16 of geese that you are talking about, that there are
17 other populations of geese in Canada that occupy
18 similar areas elsewhere in Canada.

19 Q I realize that. The
20 population that we have been discussing, it may be
21 affected --

22 A Yes.

23 Q -- or potentially there
24 to be affected by, not just this development but anything
25 that happens in this area, be it natural or manmade, is
26 approximately 350,000 -- 300,000 or more, sorry.

27 A Our figures for the
28 past few years range from 160,000 to about 400,000.

29 Q Right. Now, let's say
30 that we have an ordinary, natural disaster for geese

1 staging, and that is an early storm that forces them
2 off the North Slope. Where do they go?

3 A They go to the Mackenzie
4 Delta. They did this year, anyway.

5 Q Yes, and this was the
6 case this year.

7 Now, I understand they went
8 to the area which is proposed to cross by the new
9 amendment to the Applicant's routing, the cross-delta
10 route?

11 A That is one of the
12 areas they went to, yes.

13 Q All right, and that is
14 an alternate, in the sense of being available when the
15 North Slope isn't available and it may also be an
16 area where some of them go anyway, whether they --

17 A That was the case this
18 year, yes, and in past years some of them used that,
19 yes.

20 Q And in assessing, and
21 I don't want to get into the specifics of the cross-
22 delta because I know that Mr. Marshall will be bringing
23 you back for that, but in assessing the cross-delta,
24 I assume you have to take it into consideration as an
25 alternate staging area for geese that might otherwise
26 be staging on the North Slope?

27 A That is true.

28 Q So if you force the
29 geese off the North Slope by either a snowstorm or
30 some manmade disturbance, some of them anyway would go

Banfield, Gunn, Hemstock
McCart, Jakimchuk
Cross-Exam by Bayly

1 to the vicinity of the Mackenzie Delta crossing?

2 That would be their natural inclination?

3 A It depends on the climatic
4 situation at the time. You can say, I think , at
5 least some would go to the Mackenzie Delta.

6 Q Right, all right. Let's
7 say that this year had been the construction year,
8 the first construction year and that material was
9 being brought in to cross the delta, the birds would
10 have gone to where the delta crossing was being prepared
11 presumably?

12 A Right.

13 Q Now, where would they go
14 from there if human disturbance caused them to move
15 on?

16 A Well, under that cir-
17 cumstance our recommendation would be that construction
18 would shut down.

19 Q All right, now, Mr.
20 Hemstock, what would happen, would construction shut
21 down?

22 WITNESS HEMSTOCK: In that
23 situation, yes.

24 THE COMMISSIONER: If that
25 were to occur, how long might it be necessary for
26 construction to be down? Would you know, Dr. Gunn?

27 WITNESS GUNN: It might be
28 two weeks, sir.

29 MR. BAYLY: Now, that might
30 mean, I put it to you, Mr. Hemstock, that barges that

1 you had coming in to bring material into this site might
2 get frozen in and you might have to bring the material
3 in by cat train or some other means after freeze up
4 because this is not only a critical time for the geese,
5 but it is in the vicinity of the freeze up time, is
6 that correct?

7 WITNESS HEMSTOCK: That material
8 might have to be landed at an alternative site.

9 Q Yes. It is a critical
10 time, though, for bringing in material, would you agree
11 with that?

12 A Yes, it is along the
13 coast.

14 Q Yes. Now, one of the
15 things that you did in your experiment was to disturb
16 birds by the use of aircraft and fixed wing and
17 helicopter aircraft to see what happened to them, and
18 I am assuming, and you can correct me if I am wrong,
19 that there are some things that happened to the birds
20 that you did measure and some other things that you
21 may not be able to -- that you might not have been
22 able to measure.

23 Now, you were able whether
24 they were disturbed enough to fly.

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1 MR. MARSHALL: Deal with your
2 assumption first before getting into the specifics.

3 MR. BAYLY: Mr. Commissioner
4 --

5 MR. MARSHALL: I think he's
6 entitled to have a question put to him, not a bunch
7 of assumptions and then, "correct me if I'm wrong", but
8 with all due respect surely he's entitled to have a
9 question put, "What assumptions did you make," and
10 "What were you able to study?"

11 MR. BAYLY: Mr. Commissioner,
12 I understand Mr. Marshall has difficulty with this
13 question, but I would submit that unless the witness
14 does and he can tell me if he does, if it's too
15 difficult to answer, then I'll be prepared to rephrase
16 it. But Mr. Marshall, I know he's gone over all the
17 material but he's not the expert and I think that
18 question was clear enough, sir.

19 MR. MARSHALL: What was the
20 question?

21 THE COMMISSIONER: Will you
22 re-state the question?

23 MR. BAYLY: Q Dr. Gunn, you
24 did some experiments on bird harassment using aircraft.
25 You used fixed wing and helicopter, is that correct?

26 A Correct.

27 Q What did that measure?

28 A Sorry?

29 Q What did that measure?

30 A I think I have to ask you

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1 which experiments you're referring to? Are you referring
2 to experiments on geese?

3 Q All right, let's start
4 with geese and we can go onto other birds; you also
5 disturbed some gulls with these experiments and let's
6 start with the geese, though.

7 A All right. The results
8 -- the activities that we looked for as indicators of
9 disturbance, is that what you're interested in?

10 Q That's right.

11 A Well, first of all we
12 studied the goose flocks under natural conditions
13 and learned how they behaved under natural conditions.

14 Q Did you do that from
15 blinds so that they couldn't see you or be aware of
16 your presence in any way?

17 A Yes. Then once we were
18 familiar with the normal actions of these geese, we
19 deliberately flew aircraft over them at certain intervals
20 of time and the primary indication of disturbance
21 that we took was, if the flock or some percentage of the
22 flock actually took flight. There were other minor
23 indications like the number of birds in the flock that
24 assumed the alert position with their heads up, stopped
25 feeding / ^{and so on,} but the primary indicator of disturbance that
26 we used was that the birds took flight.

27 Q All right. Now your
28 experiments didn't measure their increase in heart beat

29 A No.

30 Q And it didn't measure

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1 whether or not they went off their feed. I'm not
2 criticizing it, I'm just suggesting there were some
3 things this experiment could not measure.

4 A Would you elaborate on
5 "going off their feed", what do you mean by that?

6 Q Well, you don't know
7 whether it affected their appetites. I mean that
8 seriously.

9 A We have measurements of
10 the amount of time they spent feeding.

11 Q So it did measure the
12 amount of time that they were not feeding.

13 A I can tell you on an
14 average, in an average hour of daylight time on the
15 North Slope, geese spent 34 minutes feeding, 11 minutes
16 in an alert position, 8 minutes sleeping, 3 minutes
17 flying, and 4 minutes doing other things such as
18 preening or bathing or drinking. So that -- and this
19 is over a good many hours of observation, perhaps more
20 than a thousand hours of observation; so that that
21 average was pretty reliable, and I don't think that we
22 detected any strong change in that during or after the
23 -- that is in their feeding procedure -- during or
24 after the aircraft experiments. When they fed, they
25 fed. Whether their intake was more or less in a given
26 period of time than before the experiments, I couldn't
27 say.

28 Q All right, so there are
29 some things that are difficult to assess. For example,
30 whether -- can you tell me for example in birds whether

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1 anxiety causes the use-up of energy?

2 A We got an indication of
3 anxiety in the amount of time they spent in the alert
4 position, and after aircraft flights we measured the
5 amount of time that it took them to settle down and
6 begin feeding again.

7 Q All right, and if you
8 have Mr. Hollingworth's example of a nesting eider
9 duck that does not go off its nest even though buzzed
10 very low by an aircraft, that doesn't mean that
11 you didn't disturb them.

12 A No, I quite agree, I
13 think that those nesting eiders deserve medals for
14 sticking it out the way they did.

15 Q Yes, but more than that,
16 Dr. Gunn, it's more than deserving medals, it may be
17 that the next time they see an airplane it may really
18 disturb them more than it would have if they hadn't
19 had the initial flight. Would you agree with that?

20 A You mean it would be
21 a cumulative effect?

22 Q Yes. Has that been
23 measured?

24 A Well, it might work both
25 ways. It might be cumulative in that they would tend
26 to be disturbed more easily, or on the other hand they
27 might go the other way and become more acclimated. I
28 think both situations occur in nature.

29 Q Right, but barring the
30 kind of situation where they may acclimatize themselves

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1 to a harbor or a park where people are constantly
2 present, have you any indication of whether your
3 experiments made them airplane shy?

4 A The results of our
5 experiments were that, on the occasion when we flew
6 over the birds every half-hour, that they became more
7 acclimated in the afternoon, towards the end of the
8 day. The judge presiding over the Federal Power
9 Commission asked me, "Could it be that the geese were
10 simply tired by that time of day?"

11 I said, "Yes, it was possible."

12 THE COMMISSIONER: We're
13 a pretty astute crew, you know. Nothing gets by us.

14 MR. BAYLY: Q Well, would you
15 agree with me, Dr. Gunn, that one of the difficulties
16 with these kinds of things, is you know when birds are
17 disturbed that they fly, you're not quite sure
18 whether the anxieties that they experience because of
19 an overflight may cause them to either become acclima-
20 tized or to become aircraft shy, and that this may
21 have some effect on them if they're migrating birds,
22 as they move along on their southward journey. Not
23 only will it have an effect on the North Slope, it
24 may have an effect elsewhere.

25 A Well, the ultimate measure
26 of that, I think, is the amount of weight they put on,
27 the amount of fat they put on, over the period of time.
28 Presumably if they're not unduly disturbed and they're
29 not over-anxious and their heart rate is reasonably
30 normal, they would put on a certain amount of weight,

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1 and we do have baseline figures for that. Now, we
2 have considered the effects of aircraft in (a) cutting
3 down the amount of time available for them to feed
4 through disturbance, and also the amount of energy
5 they use up when they fly away.

6 Q Now, one of the side
7 effects of this occurs at times other than staging, as
8 I understand, you especially have colonizing birds and
9 you've disturbed them with aircraft, they are leaving
10 the nest, if some of them leave nests, gives opportunity
11 for predators -- gulls, foxes, and perhaps other
12 species -- to move in and take an egg or two.

13 A Correct.

14 Q So although you may not
15 see it in terms of dead birds, if we used the kind
16 of McCart analogy to "if I see some dead fish then
17 I'm worried," you may not see the dead birds, you may
18 just lose an egg from the nest and the bird never
19 lives.

20 A Well, you get evidence
21 that the nest has been raided and the egg is broken or
22 missing, or that the young don't fledge successfully.
23 We can measure it.

24 Q Yes. One of the diff-
25 iculties, of course, of measuring it is that you've
26 got to go into the colony yourself and that invites
27 predators in.

28 A Right.

29 Q That makes it a very
30 difficult thing to measure.

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1 A Yes,

2 Q Did you do that kind of
3 measurement, or for that reason did you avoid that
4 kind of thing?

5 A In the experiment on
6 Nunaluk Spit it was evident that our observers
7 there had the effect of keeping birds, incubating birds
8 off the nest, off the eggs, for some considerable time
9 and from that we deduced that prolonged activity of
10 that kind would undoubtedly affect the productivity of
11 the nests.

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1 Q All right, and that is the
2 Catch-22 of monitoring, too, isn't it, that in order
3 to monitor, you may have to continue disturbance, so
4 you have to find a point at which you can monitor
5 without doing more damage than the activity that
6 you are monitoring?

7 A It is always a factor
8 in experimental work. In some cases it is more important
9 than in others, in that case it was important. In others
10 it can be minimized but you can never get rid of
11 it entirely.

12 Q Right.
13 Now, one of your concerns, and
14 it would be related to this kind of monitoring, among
15 other things, is human presence with regard to birds.
16 Birds are very shy of human beings.

17 A Some birds.

18 Q All right, I will take
19 that as true, and I shouldn't have been that wide in
20 the question. Some of the birds on the North Slope
21 are very shy of people?

22 A Right.

23 Q And some of the
24 colonizing species are among these?

25 A Yes.

26 Q Now, you've talked in
27 your recommendations about controlling human behaviour,
28 that is, in relation to the bird populations of certain
29 species and at certain times, and you made recommenda-
30 tions to the Applicant, and one of the difficulties,

1 apparently, that they faced in Alaska, is the control
2 of people, and while I can accept Dr. McCart's and
3 Mr. Hemstock's view that you may have a minimal effect
4 on fishing from camps, because you outlaw fishing
5 rods and you place your camps more than walking
6 distance away from the good fishing spots, which are
7 upstream; what do you do about people that just
8 want to take a walk along the beach?

9 This becomes a difficult
10 problem, I submit to you, Mr. Hemstock, would you
11 not agree?

12 WITNESS HEMSTOCK: It is
13 probably fairly difficult, but we anticipate making
14 it a stipulation of people who work at the compressor
15 stations that they remain within the fenced boundary
16 of the station, and similarly with those at the
17 staging sites, that they remain on the staging
18 site.

19 Q And the other kind of
20 problem is that not only your monitors, but any monitors
21 of your monitors, whether they be from government or
22 wherever, may add to the disturbance that your people
23 may potentially cause by wanting to see what's going
24 on?

25 MR. MARSHALL:
26 Well, we wouldn't attempt
27 to speak for the monitors of any Arctic Gas monitors
28 at all.

29 MR. BAYLY:
30 Well, Mr. Horte was pre-
pared to do that, Mr. Commissioner. He even recommended
that there be a single agency to monitor all this and --

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Cross-Exam by Bayly

1 THE COMMISSIONER: Well, the
2 point is an argumentative one and it has been made.

3 MR. BAYLY: Yes.

4 THE COMMISSIONER: I understand
5 the difficulties.

6 MR. BAYLY: There will be
7 people, in other words, Mr. Hemstock, that this
8 project will generate over which you have less control
9 than you do over your own employees?

10 A That is right.

11 Q And that is a concern
12 to you, Dr. Gunn, because you are worried about
13 disturbance by any human beings, whatever badge they
14 happen to be wearing?

15 WITNESS GUNN: I think that
16 the greatest single problem to confront bird populations
17 and perhaps wildlife populations in the Arctic is
18 uncontrolled access by people.

19 Q Now, we were discussing
20 the fact that certain species are disturbed by people and
21 certain others are not. Now, I take it in this regard
22 that Lapland Longspur, for example, is a species which
23 is -- I hesitate to use the term "resilient", but
24 at least "adaptable" to the presence of people. You
25 find them nesting, for example, in some of the communities,
26 would you agree with that?

27 A To some degree.
28 To some degree.

29 Q I don't say that you
30 can't disturb them, but you can't --

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Cross-Exam by Bayly

1 A What I was thinking
2 of was that in the experiment we did on human at
3 presence at Firth River showed that the productivity
4 of Lapland Longspurs on the test plot was somewhat
5 less than on the control plots.

6 Q Yes.

7 And were these -- and this
8 was something that I wasn't able to determine from your
9 experiment -- were there birds that chose to nest in
10 proximity to your human behaviour intrusion test
11 site?

12 A Yes, the birds had
13 taken up territories by the time we'd got the
14 plots laid out.

15 Q All right, but where they
16 would be nesting in established camps for settlements,
17 they might have made that choice after the establishment
18 of that settlement, and that wouldn't be unique?

19 A It would not be unique
20 in the vicinity, I wouldn't say right in the camp
21 settlement.

22 Q Yes.

23 A For instance, I understand
24 that at Churchill, Manitoba, Lapland Longspurs used to be
25 found commonly around the outskirts of the small
26 community. Now you have got to go farther out to
27 find them because there is more activity there and the
28 town has spread out a bit. They are not right in
29 town. Snow Buntings come into town, but I don't think
30 that Lapland Longspurs do, in my experience.

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McCart, Jakimchuk
Cross-Exam by Bayly

1 Q Is that a question
2 of reduction of habitat, or is that a shyness of people?

3 A I wouldn't know.

4 Q But that is something
5 that may be of significance? Some birds disappear
6 because there is not place for them to nest or no
7 food for them to eat and others disappear because people
8 are present even though there are places for them to
9 nest and food for them to eat?

10 A I think both situations
11 are possible, yes.

12 Q And so with Lapland Long-
13 spur were you able to determine whether they were
14 shy of human presence, or whether their productivity
15 was really related to this?

16 A The birds remained
17 there through the experiment. It was the results of
18 the success they had in raising young that showed the
19 difference.

20 Q Yes. Now, I gather that
21 that is the kind of concern that you have for some
22 of the raptors that, for example, I believe it is the
23 peregrines that start their nesting very early -- I am
24 sorry, the gyrs that start very early, is that correct?

25 A The gyrs start early,
26 yes.

27 Q And so if they nest
28 early and lay their eggs early, if you disturb them
29 it may not take very long for the eggs to get cold?

30 A That is correct.

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McCart, Jakimchuk
Cross-Exam by Bayly

1 Q Now, you have referred,
2 I believe, to some other problems, I am referring to
3 Volume 30, of the Biological Report Series, Chapter 2,
4 page 33, and the first paragraph of that volume, and
5 that page says:

6 "The death of the embryos could result
7 from their being exposed to cold or from
8 their being knocked from the nest by an
9 incubating adult who suddenly flushes."

10 And you referred to the pair of gyr falcons at site
11 139, they left their nest for approximately one hour
12 during a period of intense cold and the eggs were
13 subsequently abandoned.

14 So it may be that even in
15 their rush to get out, the falcons may knock their
16 eggs out or even thier young out of the nest as a
17 a result of disturbance and that is another concern
18 quite apart from the eggs getting cold?

19 A This is possible, yes,
20 that is what it says.

21 Q And of particular concern
22 during the construction phase, if construction occurs
23 close to any of the nesting areas because the time of
24 the nesting and the construction activity coincide?

25 A Yes, the gyr falcon presents
26 a special case in that the occupation of the ledges and
27 the nest building and egg laying activities take
28 place early in the year from early in March on, so that
29 we have to be particularly careful with winter construc-
30 tion in the vicinity of gyr falcon nests.

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Cross-Exam by bayly

1 Q When I raised this concern
2 with Ms. Minning, with regard to the Campbell Hills,
3 she appeared, now that was not gyr falcons, but
4 peregrine falcons, but she appeared not to have realized
5 that this was a possible concern area of yours, and I
6 am wondering if you consult with here as well as the
7 other environmentalists to let them know of the
8 potential nesting sites.

9 A I am not clear on the
10 first part of your statement. You said that this was
11 not a concern of hers?

12 Q No, not that it was not
13 a concern, but she was not aware that this was a
14 concern of yours.

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Cross-Exam by Bayly

1 A What was a concern of
2 mine?

3 Q Not that it was not a
4 concern, but that she was not aware that this was a
5 concern that there were peregrin falcon nesting in the
6 Campbell Hills and that earlier today in your evidence
7 you stated that this is an area of high concentration
8 of these birds. Now I am interested in the process
9 of how that information gets to her, so that when she
10 is identifying material mining sites she doesn't pick
11 one that you have identified as one being very important
12 for these raptors.

13 A Well, as a matter of
14 fact we have just -- I don't know what her normal
15 routine is, but we have just been considering a case
16 like that where a firm needed rock of a type that's
17 found in Campbell Hills and there are peregrine sites
18 in the vicinity of that rock. So that in that case what
19 we did was to introduce representative of that firm
20 to the appropriate representative of the Canadian
21 Wildlife Service to bring them together. He could say,
22 "We would like access to some of this rock. What is
23 available and what is not available, and what do your
24 peregrines need in that case?" That's the approach that
25 we have used.

26 Q When you were considering
27 routing and your various recommendations, did you consider
28 it in light of repair activities during critical times
29 for birds, in particular nesting or staging, let's take
30 staging on the North Slope?

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McCart, Jakimchuk
Cross-Exam by Bayly

1 A Sorry, you have repair
2 activities and staging?

3 Q Yes, now we asked Mr.
4 Dau at one point if he would tell us what would be
5 involved in repairing a break in the line in the North
6 Slope, and he said that was a very small statistical
7 possibility, but that assuming that it could occur he
8 told us that it would take approximately 50 men and
9 they would do a temporary repair during a critical time
10 and go back later on and do a major repair that might
11 involve a longer period of time. Now, when you were
12 making your recommendations about routing did you take
13 into consideration the problems of having to go there
14 for emergency reasons?

15 A Not especially. I consider
16 that wherever the pipeline goes these sort of emergen-
17 cies may arise. My concern is to have that emergency
18 operation carried out in an orderly controlled fashion
19 so that the minimum disturbance to birds is effected.

20 Q Now, Mr. Dau was referring
21 to this at page 2000 of the transcript in Volume 17,
22 he was asked the following questions and gave the
23 following answers, and perhaps you could indicate
24 whether it would be a concern of yours from a bird
25 point of view.

26 "Q I realize, Mr. Dau, have you contemplated breaks
27 as a remote possibility?

28 A That is correct.

29 Q So this was not then considered the possibility
30 of say, having to do a repair while the caribou

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Cross-Exam by Bayly

1 were in the area?

2 A This was not considered, no.

3 Q Would it in your opinion make this a less than
4 prime route to realize that this were a possibility
5 and might do some damage to the caribou herd?

6 A Not in my opinion.

7 Q All right, assuming it happened when the geese
8 were nesting, would your answer be the same?

9 A It would have more effect, the coastal route would
10 have more effect if a repair was necessary at the
11 time the geese were in the area.

12 Q Yes, staging, sorry."

13 So he acknowledged that it
14 might have an effect that he could recognize but that
15 it was not a consideration in routing, as far as he
16 was concerned. Now the reason I ask you this is I
17 want to know at what point in the process you and the
18 other environmental consultants came into the picture ,
19 and am I correct in assuming that it was after the
20 prime route had been chosen?

21 A Sorry, I don't see the
22 connection between the two. I can see your last question.
23 I don't see what it has to do with the statement that
24 you made before.

25 Q Mr. Dau has said that
26 in selecting the prime route it wasn't a consideration
27 that any repairs might have to be done, on the North
28 Slope, at times that were critical for either caribou
29 or geese.

30 A I understand that.

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McCart, Jakimchuk
Cross-Exam by Bayly

1 Q All right. Now, you have said
2 at an earlier -- to an earlier question that no, you
3 didn't consider that specifically but you were aware of
4 critical times and the necessity perhaps to do repairs.
5 Now can you tell me in the selection of the prime route
6 were you as a consultant employed at that time, or
7 were you employed to comment on the prime route?

8 MR. MARSHALL: What time are
9 we talking about, Mr. Bayly? Employed at what time?
10 He's detailed his evidence when he started his work.

11 MR. BAYLY: Q You asked Dr.
12 Gunn to comment on the prime route or to help select
13 a prime route?

14 A We were asked to comment
15 on both prime route, what has now become the prime route,
16 and the interior -- the alternative route at the time
17 we were asked to -- about it, it was then the coastal
18 route and the interior route. These routes were
19 both roughly laid out for our consideration.

20 Q All right.

21 A Before --

22 WITNESS McCART: We were
23 also looking at routes down both the east side and
24 west side of the Mackenzie Valley.

25 WITNESS GUNN: Right.

26 Q So you had as far as
27 crossing the Yukon is concerned, you had two routes
28 to consider. I gather that neither you nor any of the
29 other consultants, to your knowledge, put forward a
30 route of your own.

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Cross-Exam by Bayly

1 A We did not cross the
2 Yukon, no.

3 Q Is that true of the other
4 members of the panel, did you put forward any particular
5 routes that were not presented to you by the applicant?

6 WITNESS MCCART: In terms of
7 main routes equivalent to the coastal and the interior
8 route? No.

9 Q Yes, did you suggest one
10 down the middle or --

11 WITNESS GUNN: We gave opinions
12 on a route such as an off-shore route and these are
13 considered in the alternatives. But we did not our-
14 selves propose a route, if that's the question.

15 Q Now, one of the jobs
16 that appears from the guidelines, 1972 pipeline guide-
17 lines at page 11 over 4 states as follows:

18 "In relation to the pipeline corridors identified
19 in 1 above, the government will identify geo-
20 graphic areas of specific environmental and
21 social concern or sensitivity, areas in which
22 it will impose specific restrictions concerning
23 route or pipeline activities and possibly areas
24 excluded from pipeline construction."

25 Now the guideline goes on, but I'm going to stop there.

26 Now, that's not your job, I realize that, but did you

27 identify for the applicant any areas that in your

28 opinion fit into this category? Or this series of

29 categories, areas where there should be specific

30 restrictions, areas that should be possibly excluded from

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pipeline construction?

A Yes, we did.

Q All right, and was the
Canning River one of those?

A No.

Q All right, and what was
one of those?

A Old Crow Flats.

Q All right, and was that
the only one?

A That's one I can think
of at the moment.

THE COMMISSIONER: Well, it's
20 after 5, I think that we might adjourn for the day
and Dr. Gunn could consider that question overnight.

MR. BAYLY: I didn't mean that
question specifically for Dr. Gunn either, Mr.
Commissioner. The other panelists may well want to
comment on that particular guideline and whether they
responded to the applicant for it. I don't mean
necessarily now but perhaps in the morning.

THE COMMISSIONER: O.K. Well,
under our new hours we sit Tuesday through Friday from
9:30 to 12:30, then from 2 until 5. You will remember
that I announced that a week ago Friday, so we'll adjourn
till 9:30 in the morning.

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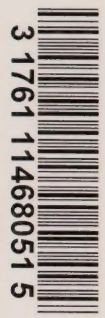
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